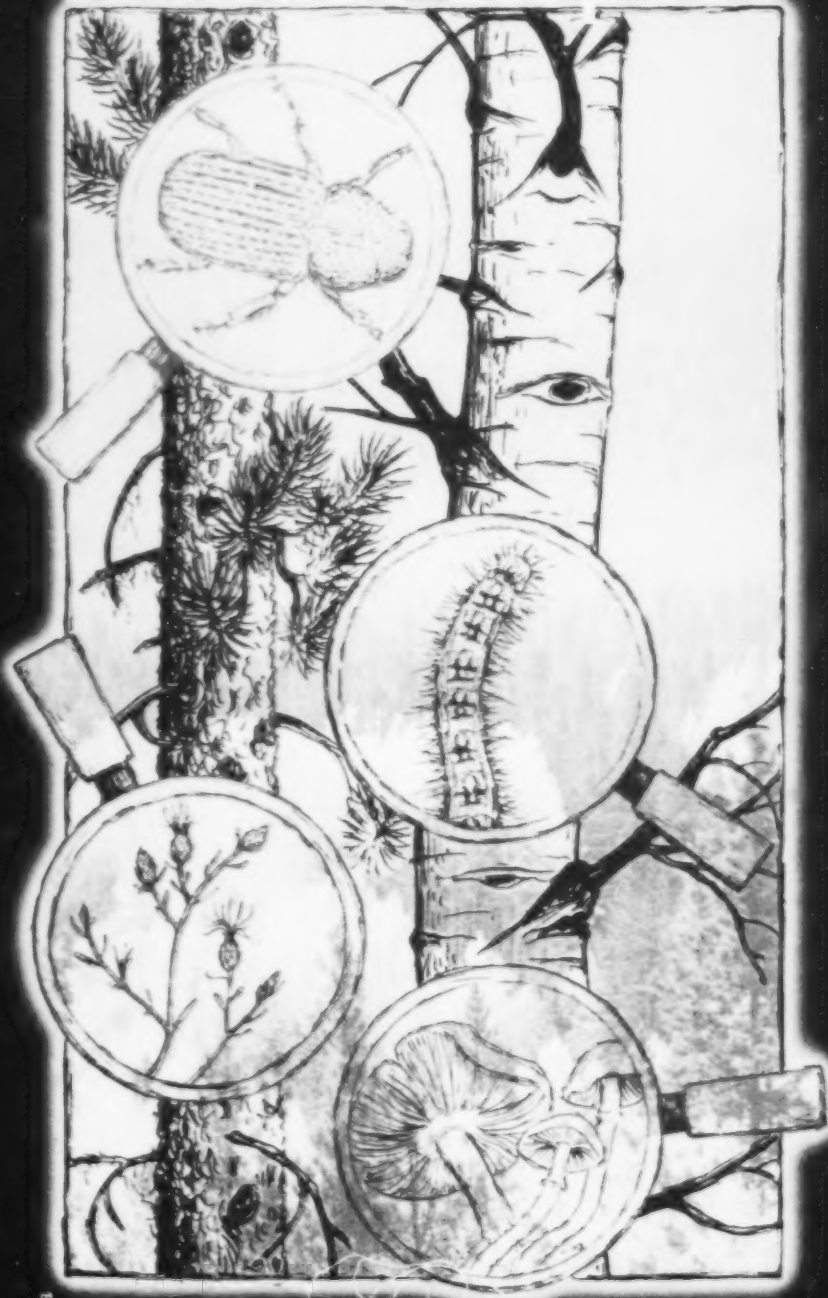
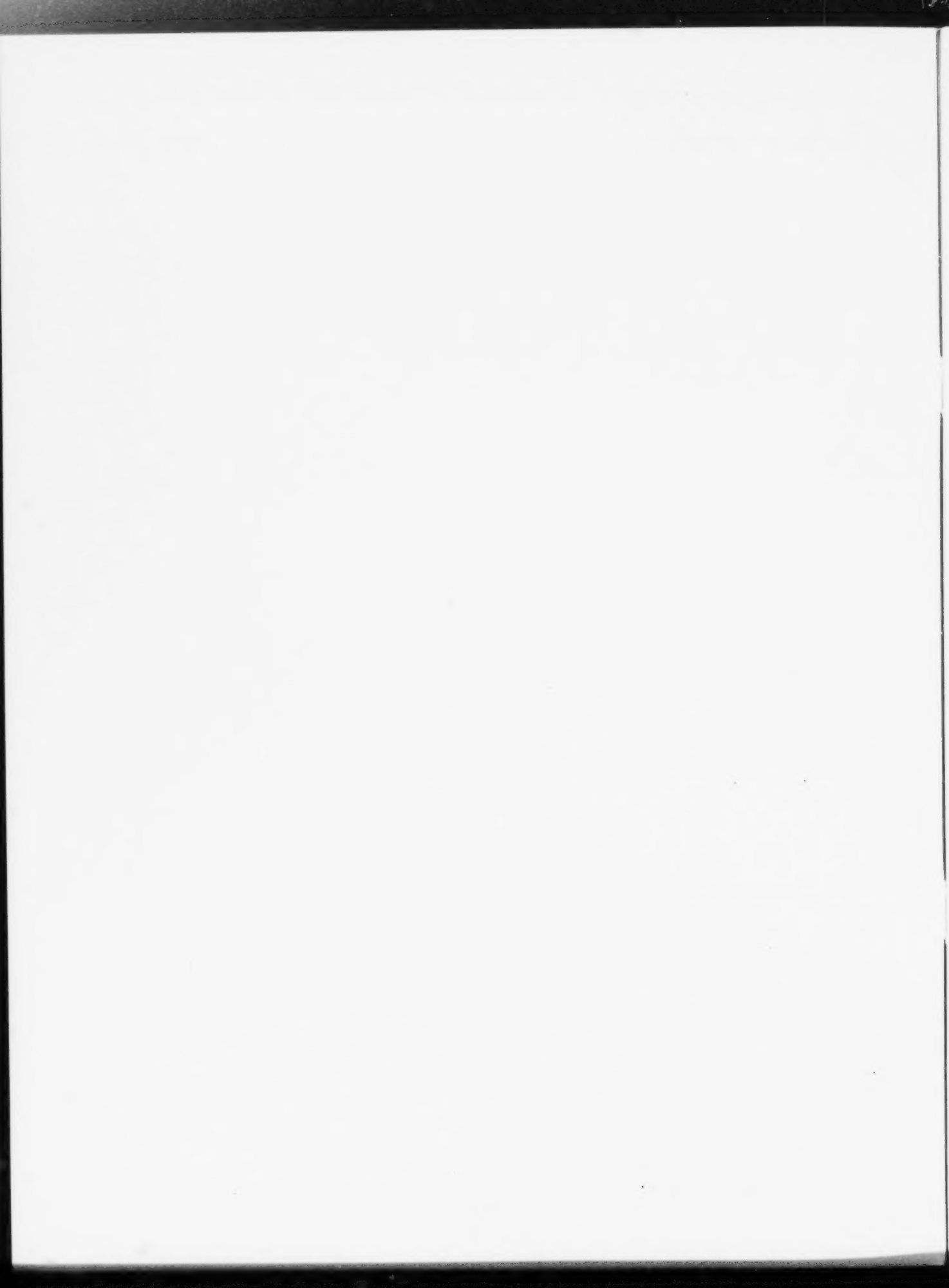


Annual Report



Forest Health in Alberta



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Alberta

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Forest Health Vision

*A healthy, sustainable forest landscape that fulfils the social,
economic and environmental aspirations of all Albertans.*



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Acknowledgements and Summary

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- Northern Forestry Centre, Canadian Forest Service (Roger Brett) for maps of spruce budworm and aspen defoliation in Wood Buffalo National Park;
- Stoney Indian Band, Bow Valley Institute, Bow Valley Provincial Park and Spray Lake Sawmills for mountain pine beetle walk-through surveys;
- Weyerhaeuser Co. Ltd. (Drayton Valley), Rocky Wood Preservers and Sunpine Forest Products for support in aerial surveys in the southern part of the Southwest Region;
- ALPAC Forest Products Inc. for help with forest tent caterpillar traps and spruce budworm data analysis;
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Summary

This is the 2004 annual report on forest health conditions in Alberta. It contains details of pest conditions, pest management programs and activities to increase forest health awareness.

In 2004, most of the forest pests that are routinely monitored in the province declined.

The populations of the spruce budworm, which is the main defoliator of spruce forests in Alberta, collapsed in northwestern Alberta in 2004. This collapse was widespread and may have been caused by the actions of a combination of biotic and abiotic agents. The total defoliated (gross and net) area declined from 158 258 hectares in 2003 to 30 651 hectares in 2004. This is an 81% decline. The severity of defoliation declined similarly.

Similarly, the large aspen tortrix populations collapsed across the province. However, the forest tent caterpillar populations increased especially in the northwest. The aspen defoliation was scattered over a gross area of 632 810 hectares, compared to 5 414 276 hectares in 2003. This is an 88% decline in affected area.

The mountain pine beetle infestations continued but were kept at bay by the aggressive management action spearheaded by the Department of Sustainable Resource Development (SRD). The number of green-attack trees outside the national parks declined from 1 316 in 2003 to 408 in 2004. However, this pest continues to pose a serious threat to the lodgepole pine resource in Alberta. In 2004, beetle attack was detected near Crowsnest Pass in southwestern Alberta, the first such detection during the current outbreak. Mountain pine beetle infestations in Alberta are expected to increase in 2004, since increased mountain pine beetle activities are being reported from adjoining jurisdictions of British Columbia and Montana in areas close to the borders with Alberta. The SRD is working in close cooperation with their counterparts in these jurisdictions to minimize the risk of beetle infestations in Alberta.

Drought and other disorders killed trees in northern Alberta.

Education and awareness, a ministerial order and a cut and burn program was used to manage the mountain pine beetle in the province.

Alberta Invasive Species Council formulated an Invasive Plant Strategy in 2004. The provincial invasive plant management is composed of education and awareness, and surveys and control programs. Several hundred sites were surveyed. Biological, chemical and mechanical means were used to control these pests.

The Forest Health Section produced posters, brochures, and a mountain pine beetle management guide to increase awareness. The forest health web site was updated to include maps, newsletters, reports, survey data and a web-based forest pest damage diagnostic system. A forest health teacher's guide was produced as well.

The spruce budworm population is expected to collapse in northwestern Alberta in 2005. Tree kill in budworm infested stands is expected to continue. The spruce budworm population in northeastern Alberta is expected to decline in 2005. The forest tent caterpillar populations are expected to rise barring unforeseen weather conditions. More mountain pine beetle infestations are expected in areas close to Alberta-B.C. border.

The regional forest health officers provided training and technology to help the industry and other personnel in forest health-related subjects.

A field study on impact of woodborer damage was completed and another on Armillaria root disease was formulated in 2004.



Introduction

This is a report on forest insect and disease pests and invasive plants monitored in Alberta's forests in 2004. It also contains the predictions for some major forest pests in 2005. The forest pest management programs carried out in Alberta in 2004 are also described in this report. In addition, this report contains the details of programs used to increase forest health awareness and to provide training. The progress of the field trials and technology development is also reported here.

The Forest Health Section of the Department of Sustainable Resource Development (SRD) manages the health of Alberta's forests. This is accomplished through effective insect, disease and invasive plant pest detection and management strategies that recognize shared responsibility with industry, municipal and federal governments.

The Department of Community Development is responsible for provincial parks and the federal government is responsible for forest health issues in national parks. Urban forest pests are the responsibility of municipal governments.

The forest health program in Alberta is managed by the provincial headquarters with the assistance of four regional forest health officers (FHO) based in three corporate regions - Northeast Corporate Region (Tom Hutchison), Northwest Corporate Region (Mike Maximchuk) and Southwest Corporate Region (Daniel Lux and Erica Lee). Embedded within each corporate region are several corporate areas. In this report, where applicable, the terms "region" and "area" refer to corporate region and corporate area respectively.

Many other forest pests, besides those reported here, affect forested Crown land in Alberta.

These include some major diseases such as the lodgepole pine dwarf mistletoe, rusts, cankers caused by pathogens, and stem and root rots like *Armillaria* root disease. As well, insect pests, e.g., terminal weevils, many species of defoliators, bark beetles including the spruce beetle, and root collar weevils are known to attack forest trees in the province. However, only details of those pests that were monitored in 2004 are reported here.

The surveys reported in this document were conducted for operational purposes within the forested Crown land and may not cover the entire forested provincial land base. Although every effort is made to ensure that all information reported in this document is accurate and complete, its integrity is not guaranteed.¹



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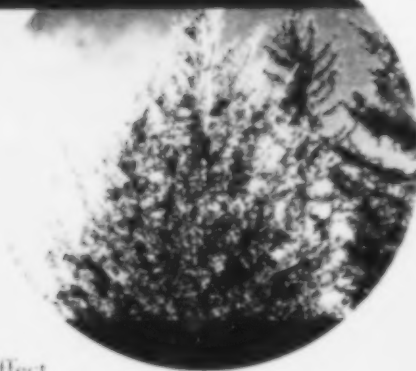
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Forest Pest Conditions in 2004

Insects

Conifer Pests

Defoliators

Spruce Budworm

Choristoneura fumiferana (Clemens)

The current outbreak of the spruce budworm in northern Alberta was first reported in the Chinchaga River area in 1987. Since then, this infestation expanded to cover large tracts of white spruce in the Northwest and Northeast regions. Between 1989-1999, aerial spraying of insecticides (Figure 1) and re-scheduled harvesting were used to manage this infestation.

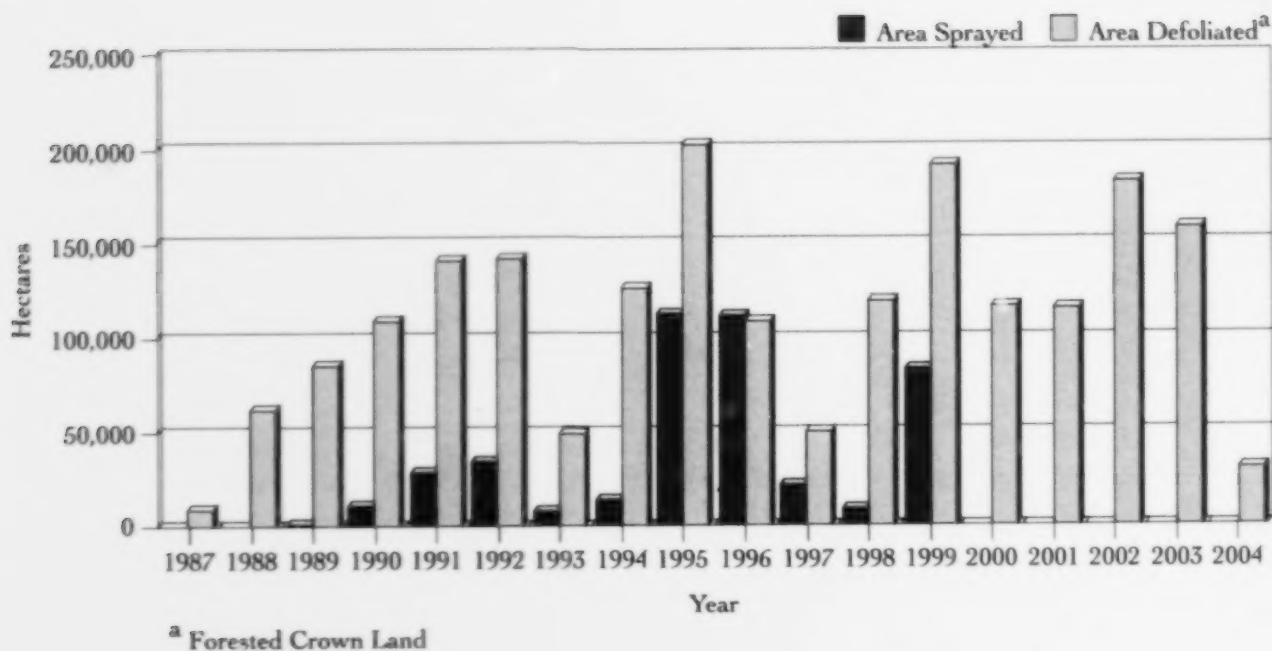


Figure 1

Number of hectares in forested Crown land annually defoliated by the spruce budworm, and the number sprayed to control the budworm during the current outbreak in Alberta.





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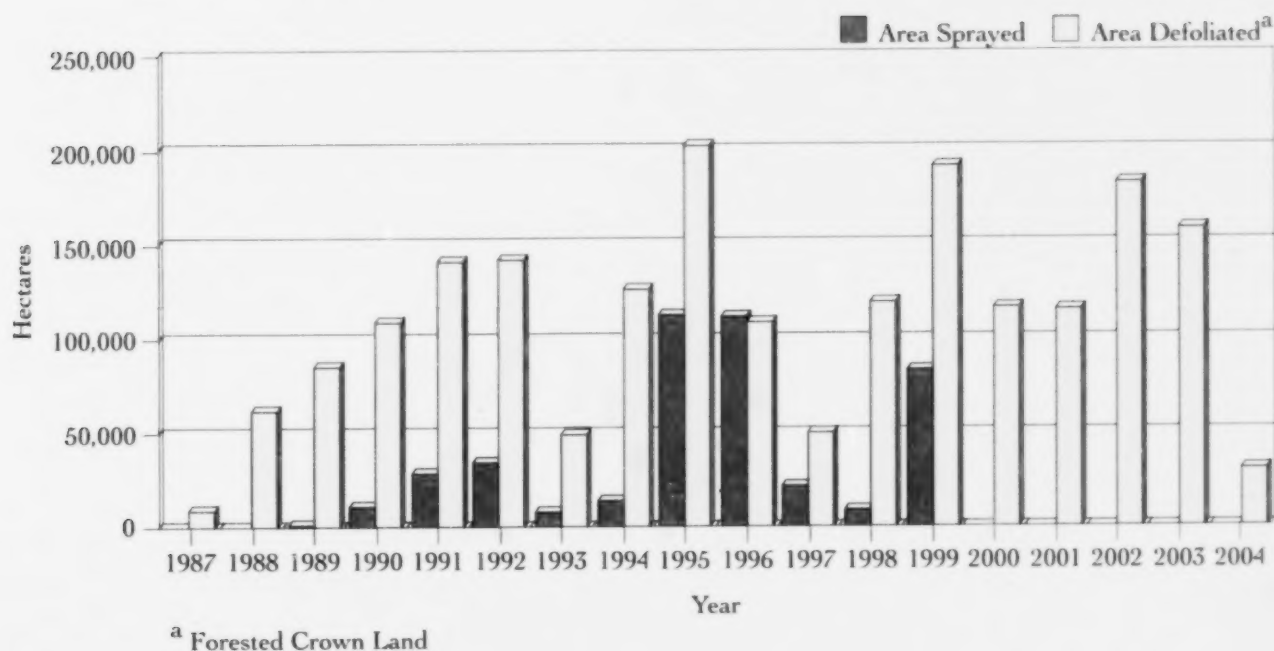


Figure 1

Number of hectares in forested Crown land annually defoliated by the spruce budworm, and the number sprayed to control the budworm during the current outbreak in Alberta.



Current Conditions

Aerial surveys were carried out in 2004 to estimate the extent and severity of spruce budworm-caused defoliation visible from the air. The procedure used for these surveys is described in the "Forest Health Aerial Survey Manual" (Ranasinghe and Kominek, 1999). The severity of budworm defoliation was rated either as moderate (36 - 70% defoliation of new buds) or severe (over 70% defoliation of new buds).

The spatial distribution of the budworm-defoliated areas in the province is shown in Figure 2. The budworm-defoliated area shown on this map is a drastic reduction compared to the area defoliated in 2003 (Table 1).

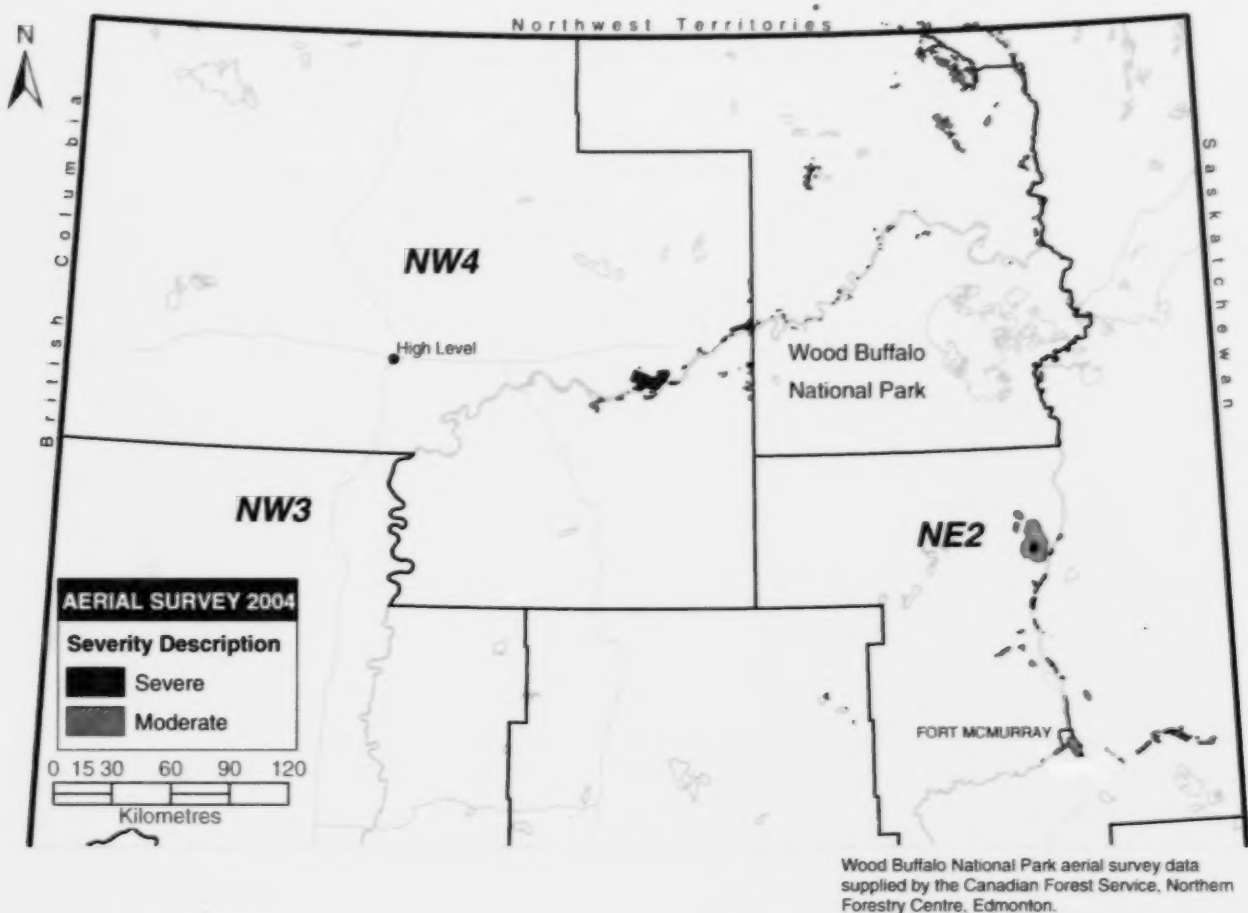


Figure 2

Spatial distribution of aerially visible spruce budworm defoliation in Alberta, 2004.



The reduction in defoliated area was more pronounced in the northwestern part of the province. A noteworthy reduction of defoliated area was also observed in Wood Buffalo National Park. The collapse of budworm populations was confirmed by lack of second instar larvae in some study plots located in northwestern Alberta². The reason/s for this sudden reduction in budworm-defoliated area is not clear. While some temperature anomalies resulting in alternate cooler and warmer conditions have been recorded in May 2004 in the budworm-defoliated areas of northwestern Alberta, this may not explain the sudden collapse of budworm populations. The lack of second instar larvae suggests either lack of or high mortality of eggs laid in 2003 fall that eventually would have hatched to produce 2004 larval population. The lack of eggs may be a result of either high moth mortality due to natural factors or low

moth fecundity due to lack of nutrients in 2003. The lack of nutrition may be attributed to large-scale spruce tree kill reported in areas that had many consecutive years of severe defoliation. Relatively high incidence of *Neodema* sp. populations was recorded from spruce budworm larval samples collected in northwestern Alberta for another study³. It was also interesting that populations of *Choristoneura conflictana*, closely related to the spruce budworm, also collapsed in northwestern Alberta in 2004. It is likely that the 2004 budworm populations were reduced by a combination of factors such as lack of vigour, natural enemies, poor nutrients and inclement weather conditions that precipitated the collapse.

Table 1 shows a comparison of the extent of budworm defoliation by each severity category in Alberta in 2003 vs. 2004.

Table 1

The extent of spruce budworm defoliation by severity categories in Alberta, 2003 vs. 2004

Corporate Region	Defoliation (ha)					
	2003			2004		
	Moderate	Severe	Regional Totals	Moderate	Severe	Regional Totals
Northwest	25 026	81 078	106 104	3 165	5 987	9 152
Northeast	12 235 3 077 ^b	6 476 30 366 ^b	18 711 33 443 ^b	17 080 3 105 ^b	690 624 ^b	17 770 3 729 ^b
Provincial Sub-Totals	37 261 3 077 ^b	87 554 30 366 ^b		20 245 3 105 ^b	6 677 624 ^b	
Grand Totals			124 815 33 443 ^b			26 922 3 729 ^b

^a Excluding national parks; net area unless indicated otherwise

^b Gross area

² Andu Yohannes, Forest Health Technician, Canadian Forest Service, Northern Forestry Centre.

³ Kees van Frankenhuyzen, Research Scientist, Great Lakes Forestry Centre, Canadian Forest Service, Sault Ste Marie, Ontario



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These figures show a 78% drop in the total budworm-defoliated area in the inventoried spruce forest in northern Alberta in 2004 compared to the area defoliated in 2003. The reduction in defoliated area was more pronounced in the Northwest Region (NW) than in the Northeast Region (NE). Similarly, in the non-inventoried spruce forest, budworm-defoliated area declined by about 89%. At the provincial level the severely defoliated area was reduced by 98% in non-inventoried stands and by 92% in inventoried stands between 2003 and 2004. During this period, the moderately defoliated area decreased by 46% in inventoried stands but slightly increased (0.9%) in non-inventoried stands.

Northeast Corporate Region (NE)

The spruce budworm defoliation was surveyed on July 19-20 and on August 4 in this region by using fixed-wing aircraft. This survey was concentrated on major river drainages in this region.

The results of this survey are shown on Figure 2 and Table 2.

Table 2

The extent of spruce budworm defoliation in each severity category in the Northeast Corporate Region, 2003 vs. 2004^a

Defoliated Area	Defoliation (ha)					
	Moderate	2003 Severe	Area Total	Moderate	2004 Severe	Area Total
South of lat. 58 N ^b	12 235	6 476	18 711	17 080	690	17 770
	364 ^c	5 959 ^c	6 323 ^c	-	-	-
North of lat. 58 N ^d	2 713 ^c	24 407 ^c	27 120 ^c	3 105 ^c	624 ^c	3 729 ^c
Regional Totals	12 235	6 476	18 711	17 080	690	17 770
	3 077 ^c	30 366 ^c	33 443 ^c	3 105 ^c	624 ^c	3 729 ^c

^a Excluding national parks; net area unless indicated otherwise

^b Lac La Biche Corporate Area and part of Waterways Corporate Area

^c Gross area

^d Part of Waterways Corporate Area

In 2004, no budworm defoliation was observed south of Fort McMurray.

However, a large number of white spruce in Fort McMurray were severely defoliated by the budworm. The largest patch of defoliation was found west of McClelland Lake between Athabasca River and Birch Mountain. Several patches of moderate defoliation were found along the Clearwater River drainage and immediately north of Fort McMurray. There were two patches of moderate defoliation along the McKay River and another two patches of moderate defoliation were found along the Steepbank River. Ten patches of either moderate or severe defoliation were found along the Athabasca River between the confluences of Steepbank and Firebag rivers (Figure 2).



In 2004, the extent of defoliation in the area south of latitude 58° N in this region remained about the same as that in 2003. However, between 2003 and 2004 the moderately defoliated area increased by 40% while the severely defoliated area decreased by 89%. In the area north of latitude 58° N, the gross defoliated area was reduced by 86% compared to that in 2003. This is due to a reduction in the severely defoliated area (Table 2).

Northwest Corporate Region (NW)

An aerial survey was carried out between July 21 and September 1, 2004 to record the distribution and extent of spruce budworm defoliation in this region. The results of this survey are shown on Figure 2 and Table 3.

In 2004, spruce budworm defoliation was recorded in the Lesser Slave (NW2) and Upper Hay (NW4) areas of this region. No budworm defoliation was observed in the Peace (NW3) Area. In NW2 Area moderate defoliation was found over 263 hectares

located near Chipewyan Lakes.

In NW4 Area budworm defoliation was confined to a stretch located between John D'or Indian Reservation and Wood Buffalo National Park along the Peace River. A total of 8 889 hectares were defoliated in this area; 2 902 hectares of this area were moderately defoliated and 5 987 hectares were severely defoliated (Figure 2).

In this region, there was a 91% reduction in the budworm-defoliated area in 2004 compared to that in 2003. In 2004, the moderately and severely budworm-defoliated areas in this region dropped by 87% and 93% respectively compared to the areas defoliated in 2003 (Table 3).



Table 3

The extent of spruce budworm defoliation in each severity category in 2003 vs. 2004 in the Northwest Corporate Region^a

Corporate Area	Defoliation (ha)					
	Moderate	2003 Severe	Area Total	Moderate	2004 Severe	Area Total
Upper Hay (NW4)	22 277	66 429	88 706	2 902	5 987	8 889
Peace (NW3)	321	14 492	14 813	-	-	-
Lesser Slave (NW2)	2 428	157	2 585	263	-	263
Regional Totals	25 026	81 078	106 104	3 165	5 987	9 152

^a Net area defoliated; national parks excluded



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Defoliated Area	Defoliation (ha)					
	Moderate	2003 Severe	Area Total	Moderate	2004 Severe	Area Total
South of lat. 58 N ^b	12 235 364 ^c	6 476 5 959 ^c	18 711 6 323 ^c	17 080 -	690 -	17 770 -
North of lat. 58 N ^d	2 713 ^c	24 407 ^c	27 120 ^c	3 105 ^c	624 ^c	3 729 ^c
Regional Totals	12 235 3 077 ^c	6 476 30 366 ^c	18 711 33 443 ^c	17 080 3 105 ^c	690 624 ^c	17 770 3 729 ^c

^a Excluding national parks; net area unless indicated otherwise

^b Lac La Biche Corporate Area and part of Waterways Corporate Area

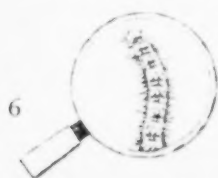
^c Gross area

^d Part of Waterways Corporate Area

In 2004, no budworm defoliation was observed south of Fort McMurray.

However, a large number of white spruce in Fort McMurray were severely defoliated by the budworm. The

largest patch of defoliation was found west of McClelland Lake between Athabasca River and Birch Mountain. Several patches of moderate defoliation were found along the Clearwater River drainage and immediately north of Fort McMurray. There were two patches of moderate defoliation along the McKay River and another two patches of moderate defoliation were found along the Steepbank River. Ten patches of either moderate or severe defoliation were found along the Athabasca River between the confluences of Steepbank and Firebag rivers (Figure 2).



In 2004, the extent of defoliation in the area south of latitude 58° N in this region remained about the same as that in 2003. However, between 2003 and 2004 the moderately defoliated area increased by 40% while the severely defoliated area decreased by 89%. In the area north of latitude 58° N, the gross defoliated area was reduced by 86% compared to that in 2003. This is due to a reduction in the severely defoliated area (Table 2).

Northwest Corporate Region (NW)

An aerial survey was carried out between July 21 and September 1, 2004 to record the distribution and extent of spruce budworm defoliation in this region. The results of this survey are shown on Figure 2 and Table 3.

In 2004, spruce budworm defoliation was recorded in the Lesser Slave (NW2) and Upper Hay (NW4) areas of this region. No budworm defoliation was observed in the Peace (NW3) Area. In NW2 Area moderate defoliation was found over 263 hectares

located near Chipewyan Lakes.

In NW4 Area budworm defoliation was confined to a stretch located between John D'or Indian Reservation and Wood Buffalo National Park along the Peace River. A total of 8 889 hectares were defoliated in this area; 2 902 hectares of this area were moderately defoliated and 5 987 hectares were severely defoliated (Figure 2).

In this region, there was a 91% reduction in the budworm-defoliated area in 2004 compared to that in 2003. In 2004, the moderately and severely budworm-defoliated areas in this region dropped by 87% and 93% respectively compared to the areas defoliated in 2003 (Table 3).

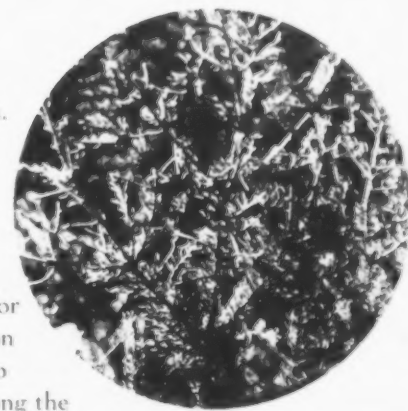


Table 3

The extent of spruce budworm defoliation in each severity category in 2003 vs. 2004 in the Northwest Corporate Region^a

Corporate Area	Defoliation (ha)					
	Moderate	2003 Severe	Area Total	Moderate	2004 Severe	Area Total
Upper Hay (NW4)	22 277	66 429	88 706	2 902	5 987	8 889
Peace (NW3)	321	14 492	14 813	-	-	-
Lesser Slave (NW2)	2 428	157	2 585	263	-	263
Regional Totals	25 026	81 078	106 104	3 165	5 987	9 152

^a Net area defoliated; national parks excluded



Tree Mortality in Budworm-infested Stands

The FHO of the Northwest Region observed relatively large-scale spruce tree kill during aerial surveys on budworm defoliation. Tree kill appears in stands with at least eight consecutive years of moderate to severe budworm defoliation. At the beginning the understorey trees succumb and by the 10th consecutive year of defoliation the co-dominant and dominant trees die. Budworm-killed trees were found along the Negus Creek, within Paddle Prairie Metis Settlement, drainages of the Shekile River, Hay River, Dizzy Creek, Little Rapids Creek, Steen River and Yates River. The tree mortality and volume loss observed in two permanent sample plots located along the Steen River are shown on Table 4.

Normally spruce budworm defoliation kills 25- 50% of white spruce in eastern Canada (MacLean and Erdle, 1984). Sewall Co. (1983) reported 18 - 40% tree kill in mature white spruce stands defoliated by the spruce budworm in Maine. The percent of white spruce kill observed in these permanent sample plots is much higher. However, the mortality figures reported here are preliminary figures based on field observations. Further investigations are necessary to firmly establish spruce budworm defoliation as the cause of the observed tree kill in these sample plots.

Table 4

Tree mortality and volume loss in two permanent sample plots in northwestern Alberta with 10 cumulative years of moderate - severe spruce budworm defoliation

Plot No.	Trees Standing		Merchantable Volume	
	No.	% Dead	Total (m ³)	% Dead
331 ^a	69.75	63.65	26.86	47.29
332 ^b	138.67	80.00	25.73	58.25
Average	104.21	71.83	26.30	52.77

^a Mean of four plots; plot area 809 m²

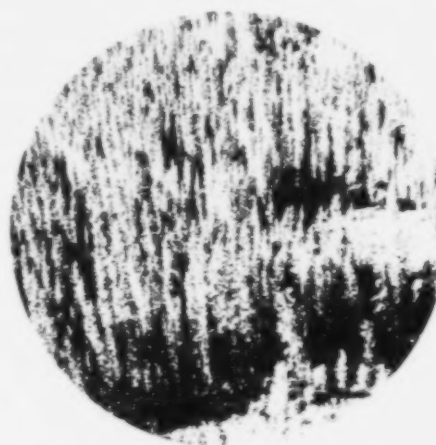
^b Mean of three plots; plot area 809 m²

Southwest Corporate Region (SW)

In 2004, there were unconfirmed reports of spruce budworm defoliation in the Porcupine Hills and Kananaskis Country. These areas are infested with the two-year cycle budworm.

Wood Buffalo National Park

Spruce budworm defoliation in Wood Buffalo National Park was aerially surveyed in the summer⁴. The defoliated area (Figure 2) was not estimated but has visually dropped significantly compared to the area defoliated in 2003.



⁴ Roger Brett, Forest Health Technician, Canadian Forest Service, Northern Forestry Centre, Canadian Forest Service, Natural Resources Canada, Edmonton, Alberta



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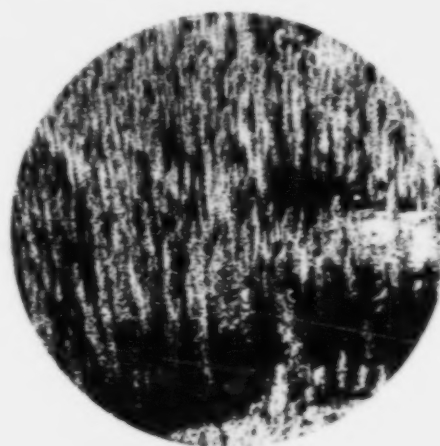
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⁴ Roger Brett, Forest Health Technician, Canadian Forest Service, Northern Forestry Centre, Canadian Forest Service, Natural Resources Canada, Edmonton, Alberta



Yellowheaded Spruce Sawfly *Pikonema alaskensis* (Rohwer)

Yellowheaded spruce sawfly continued to defoliate open grown white spruce planted on reclaimed oil and gas sites located near Fort McMurray and Cold Lake in the Northeast Region. Young white spruce plantations at Suncor® and Syncrude® sites in Fort McMurray and at Imperial Oil® reclamation sites in Cold Lake were affected by this defoliator.



Bark Beetles

Mountain Pine Beetle *Dendroctonus ponderosae* (Hopkins)

The mountain pine beetle (MPB) continued to pose a significant threat to Alberta's mature pine forests. A number of MPB-infested areas in British Columbia are located near the Alberta-B.C. border. As well, MPB infestations have been reported from Montana in areas close to Alberta along the Canada-U.S. border. Nearly 60% of an estimated 387 million cubic metres of lodgepole pine along the eastern slopes of the Rockies in Alberta are overmature and are highly susceptible to MPB.

Municipal and Private Lands

The land managers are responsible for managing MPB on affected municipal lands and the owners are responsible for managing MPB on private lands. The Department of Sustainable Resource Development (SRD) provided aerial survey data and technical know-how to manage the MPB found on these lands.

In 2003/04, the municipal land managers detected 70 infested trees in the Town of Canmore and another five trees in Harvie Heights in the Municipal District of Bighorn. On private lands, the developers detected 23 infested trees on Silvertip Golf Course and another 30 trees at Three Sisters Mountain Village.

Public Lands

Provincial Crown Land

The SRD is the lead agency for managing the MPB on forested provincial Crown land. The federal government looks after the MPB programs in national parks.

Ground Surveys 2003/2004

Ground surveys were carried out to detect "green-attack" trees, i.e., trees successfully attacked in the current year but still retaining beetles and green crowns. Two types of ground surveys, i.e., walk-through surveys and transect surveys, are carried out to detect green-attack trees. Extensive walk-through surveys delineate the general area of infestation. The results of the walk-through surveys are used to plan transect surveys that are more intensive and systematic. The results of 2003/2004 surveys are reported here because the 2004/2005 surveys are still ongoing; the results of 2004/2005 surveys will be reported in the 2005 annual report. The survey procedures used for the 2003/2004 surveys are documented in the "Mountain Pine Beetle Management Guide" (Kominek, 1999).



Southwest Corporate Region (SW)

Southern Rockies (SW1) and Clearwater (SW2) Corporate Areas

Volunteers from the departments of SRD and Community Development, Stoney First Nation, Banff National Park (BNP), Bow Valley Institute, Bow Valley Provincial Park and Spray Lake Sawmills carried out a walk-through survey from September 22-26, 2003. They covered the MPB susceptible pine stands from Banff town site to the Burnco Mine Site east of Canmore. The survey lines were tracked by using hand-held GPS units. The results of this survey from Banff National Park boundary to Burnco Mine are shown on Figure 3.

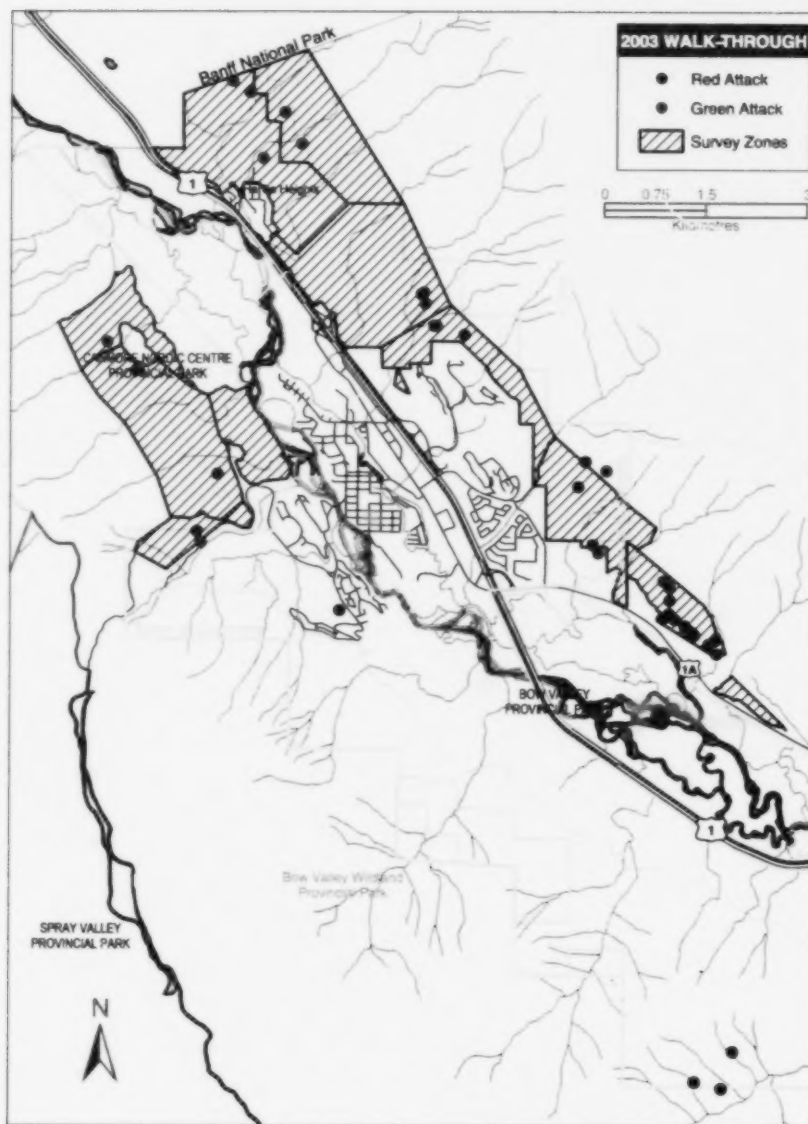


Figure 3

Locations of green- and red-attacked trees detected during walk-through surveys of Bow Valley, Southern Rockies Corporate Area, Alberta in 2003.



Based on the results of the walk-through survey, four ground survey zones were identified for transect surveys (Figure 4). A four-person crew was hired to carry out the transect surveys. This crew examined the susceptible host trees for evidence of MPB attack and flagged all attacked trees; the location of each attacked tree was recorded by using a GPS unit. The survey was carried out between November 2003 and January 1, 2004. Altogether 252 trees were identified as currently infested by the MPB. In addition, an employee of Spray Lake Sawmills identified three MPB-infested trees along the headwaters of the Oldman River.

Footbills (SW3) and Woodlands (SW4) Corporate Areas

Ground surveys were carried out in areas of Meadowland Creek, Beaverdam Creek/Avalanche Creek, a site along the Lower Kakwa River and another site along the Bloodroot Creek. Four green-attack trees were found at the Beaverdam Creek/Avalanche Creek site and 21 green-attack trees were found at the Meadowland Creek site.

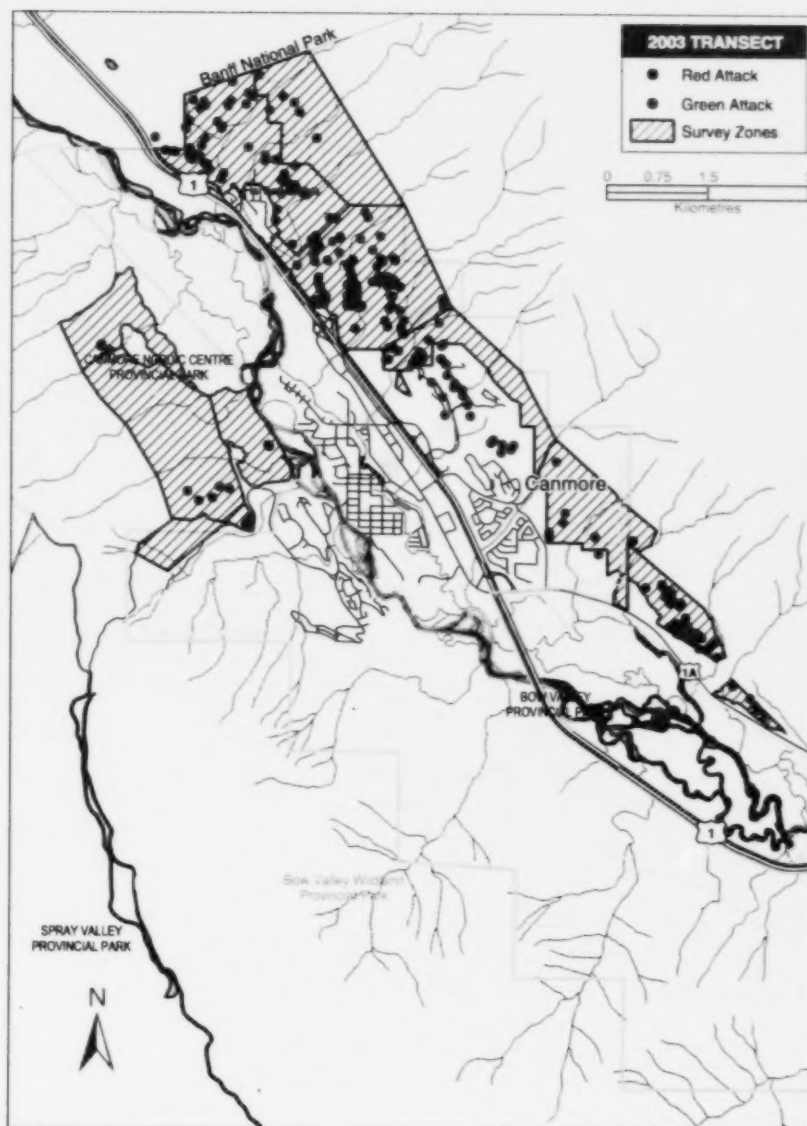


Figure 4

Locations of green- and red-attacked trees detected during transect surveys of Bow Valley, Southern Rockies Corporate Area, Alberta in 2003/2004.



Ground Surveys by Using Pheromone Baits

A two-component aggregation pheromone bait (Phero Tech Inc., B.C.) was used to monitor MPB presence in high-risk lodgepole pine stands in southwestern Alberta. The plot locations were readjusted in 2004 by removing plots located in stands where MPB is known to occur. The procedure for deploying these pheromone baits is described in "Mountain Pine Beetle Management Guide" (Kominek, 1999). The results of this survey are shown in Figure 5.

Northwest Corporate Region (NW)

Four plots with mountain pine beetle pheromone baits were established in the Smoky Area (NW1). Baited trees at two of these plots were attacked by the MPB (Figure 5). One of these plots located north of the Narraway River had 3 and 13 hits respectively on two baited trees; the other plot located north of the Wapiti River had 1, 4 and 5 hits respectively on three baited trees. None of the attacks was successful in producing progeny.

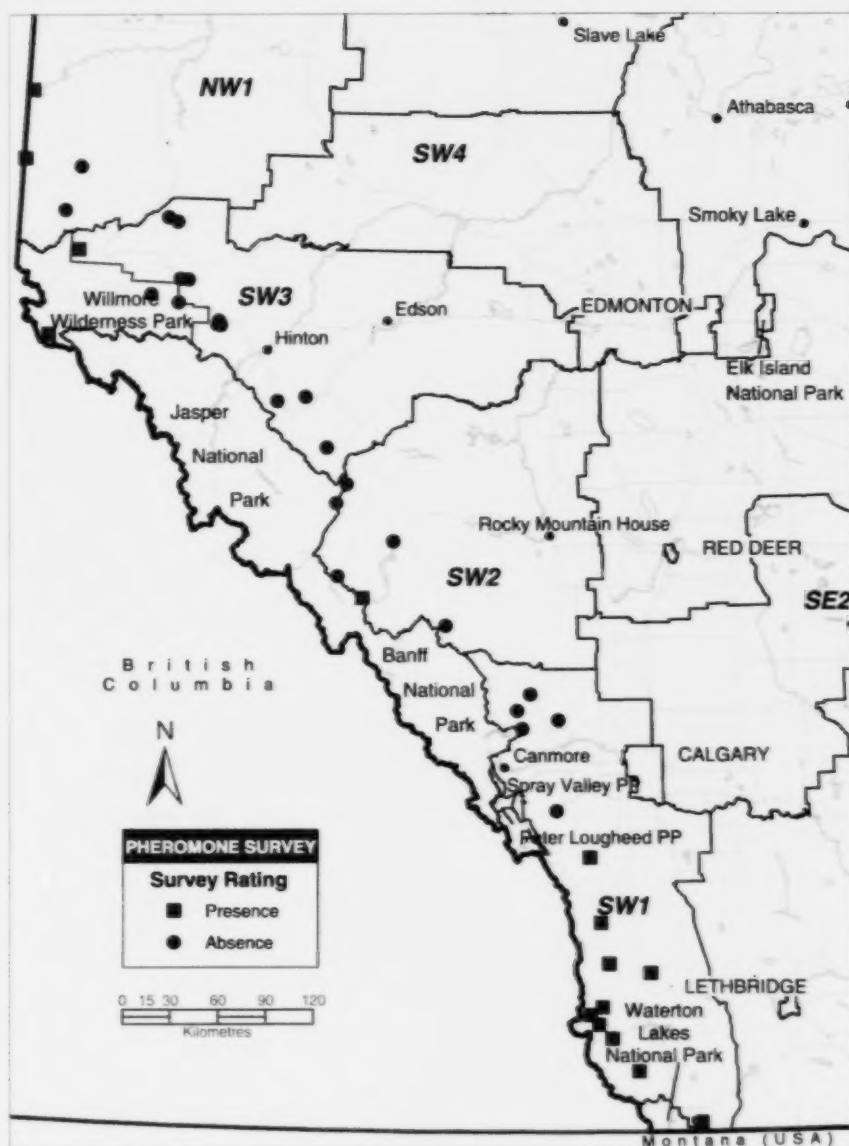


Figure 5

Presence/absence of the mountain pine beetle in pheromone-baited plots located in Alberta, 2004.



Southwest Corporate Region (SW)

Southern Rockies (SW1) and Clearwater (SW2) Corporate Areas

A total of 15 sites in the SW1 Area were baited in 2004. Trees at 10 of these baited sites had beetle hits ranging from 1 - 200 per tree. In addition, three non-baited trees also were attacked with hits ranging from 12 - 100 per tree. Six sites were baited in the SW2 Area. One of these sites had all three trees attacked with hits ranging from 2 - 19 per tree. (Figure 5).

Footbills Corporate Area (SW3)

Fourteen sites with pheromone-baited trees were established in the SW3 Area. Only two sites had trees with beetle hits. One of the three sites (Jackpine/Spider) located in Willmore Wilderness Park (WWP) had all three trees attacked with hits ranging from 38 - 81 per tree; one non-baited tree at this site had a spill-over attack with 50 hits. The other two sites located in WWP did not have beetle hits.

Only one of the 11 sites (Bloodroot Creek) located outside WWP had beetle hits in 2004. Two out of three trees at this site had 72 and 54 hits respectively. The other 10 sites, including the site in Kakwa Provincial Park (relocated further downstream along the Lower Kakwa River in 2004) were not attacked (Figure 5).

Cypress Hills Inter-Provincial Park⁵

Pheromone-baited trees at 4 out of 25 sites had beetle hits. Three of the attacked sites were located west of Willow Creek Road and the other was located at Nine Mile Coulee in the southeast corner of the park. The number of beetle hits ranged from 1-3 per tree.

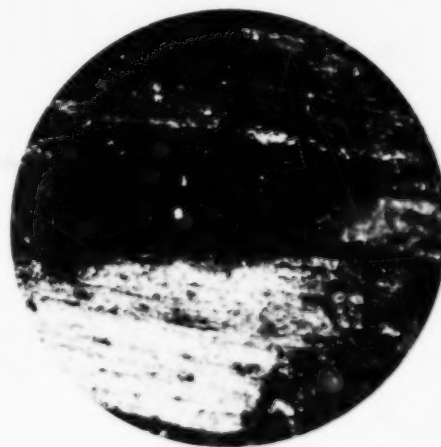
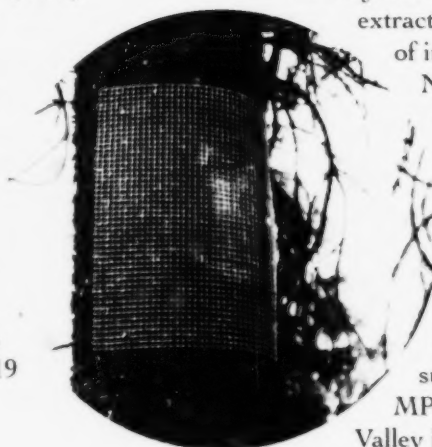
Overwintering Survival Survey 2004

In May 2004, ten MPB larvae and ten adults were extracted from under the bark on north side of infested trees distributed near Mount Norquay in Banff National Park. All the adults have died over the winter and only four larvae (40%) have survived the winter. This is a significant decrease in MPB survivorship compared to survivorship in previous year when most of the adults and larvae survived. This relatively low survivorship was expected to lower the MPB population increase in the Bow Valley in 2004 thus facilitating the control programs.

Aerial Overview Surveys 2004

Annual aerial overview surveys are carried out to detect red-attacked trees of the current year. The survey procedure is described in the "Mountain Pine Beetle Management Guide" (Anon., 2004) posted on the Forest Health web site at:

http://www3.gov.ab.ca/srd/forests/health/p_manage_mpb.html.



⁵ Based on a report submitted by Scott Murphy, Crew Leader and Les Weekes, Park Forest Officer, Cypress Hills Inter-Provincial Park, Cypress Hills, Alberta



Southwest Corporate Region (SW)

Southern Rockies (SW1) and Clearwater (SW2) Corporate Areas

Between October 6-8, 2004, lodgepole pine stands with high MPB susceptibility in the Southern Rockies (SW1) and Clearwater (SW2) areas were surveyed using a new digital sketch mapping system. The goal was to survey 70% of the stands with high to extreme hazard rating. The survey mainly covered the river valleys and mountain passes in the foothills bordering B.C. to the west and the U.S. to the south.

The results of this survey are shown on Figure 6.

In the SW1 Area, few fading trees were detected in the Bow Valley near Burnco Mine. Two patches of red-attacked trees were detected in the Crowsnest Pass adjacent to the Alberta-B.C. border. These two patches of red-attacked trees were located east of Tent Mountain, south of the Crowsnest River. This is the first indication of MPB infestations in southern Alberta during the current outbreak.

No red-attacked trees were detected in the SW2 Area during this survey.



Figure 6
Incidence of mountain pine beetle infestations in southwestern Alberta, 2004.



Several heavily MPB-infested pine stands were observed on the B.C. side of the Alberta-B.C. border during these aerial surveys. Unless control action is taken these infestations may pose a threat to pine forests in Alberta. The Forest Health Officer plans to meet with B.C. counterparts and industry representatives to discuss their plans for controlling these infestations.

Foothills (SW3) and Woodlands (SW4) Corporate Areas

An aerial survey of the Foothills (SW3) and Woodlands (SW4) areas was carried out on September 13-14, 2004. This survey covered Willmore Wilderness Park as well. The results of this survey are shown on Figure 7.

Either red or fading trees due to suspected MPB attacks were found at Meadowland Creek, Beaverdam Creek/Avalanche Creek and Casket Lake areas in Willmore Wilderness Park (Figure 7). The distribution of affected trees was patchy in Meadowland Creek area but was widely scattered in Beaverdam Creek/Avalanche Creek area. Out of the three affected areas, Casket Lake area had most of the red or fading trees. All these areas were ground truthed in the fall and were to be followed up with a MPB control program in the late fall and in early winter.

Northwest Corporate Region (NW)

No MPB-killed trees were detected during an aerial survey carried out on lodgepole pine stands in this region in October and November 2004.

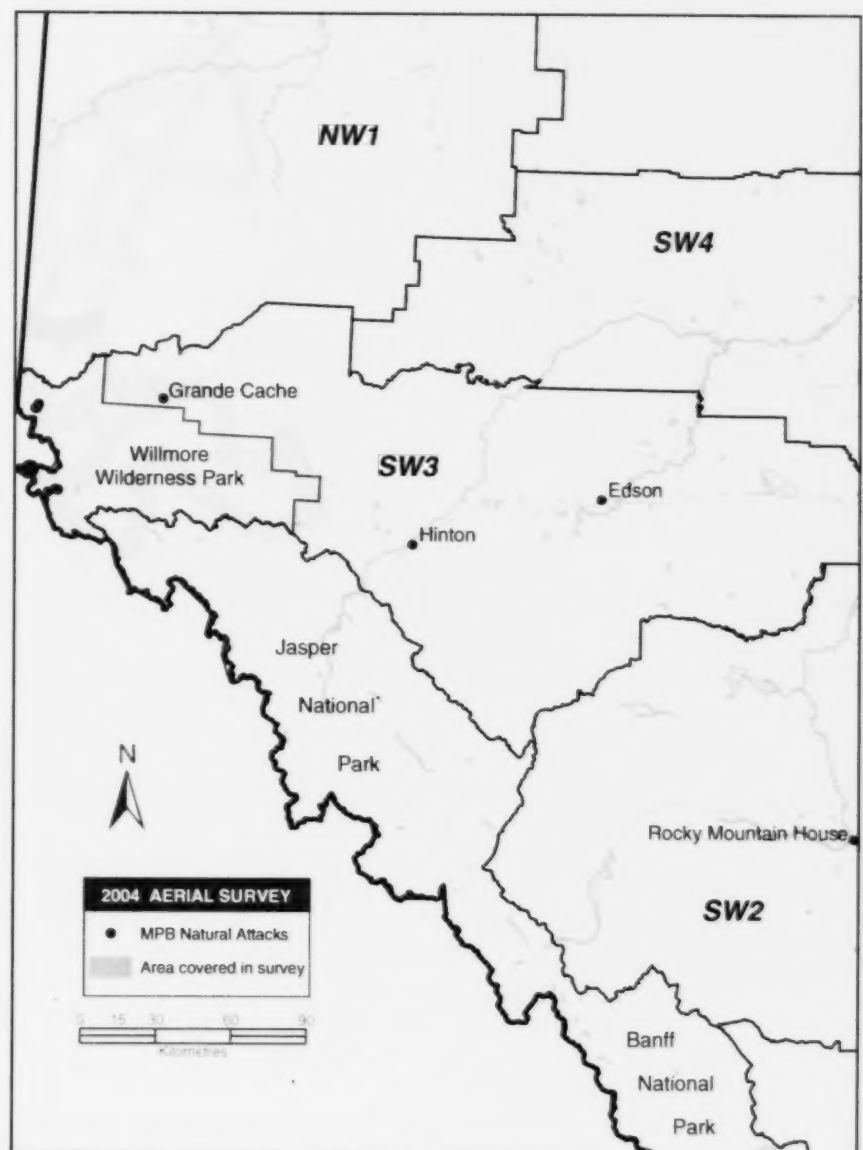


Figure 7
Incidence of mountain pine beetle infestations in Foothills Corporate Area (SW3), Alberta in 2004.



National Parks

Banff National Park⁶

Several thousand trees fading due to suspected MPB attacks were observed in the "MPB Monitoring Zone," i.e., west of Banff Town, in Banff National Park. The infested areas included Mount Norquay, Stony Mountain, and Healy Creek where the infestation still continued strong. The number of green-attacks in this zone was not monitored. A couple of hundred faders were observed in the "MPB Management Zone", i.e., east of the Town of Banff. An estimated 1 500 green-attack trees were found in the management zone where pheromone baits were used to retain MPB populations within the zone.

Jasper National Park⁷

During an aerial survey, several hundred "faders" were detected in Jasper National Park. Most of these were located in Miette Valley. Some of these "faders" may be due to an ongoing drought that has killed some mature pines in the park; groundtruthing is needed to verify the number of trees killed by the MPB.

Other Bark Beetles

Cypress Hills Inter-Provincial Park⁸

Pine engraver beetle (*Ips pini* (Say)), red turpentine beetle (*Dendroctonus valens* LeConte), and lodgepole pine beetle (*D. murrayanae* Hopkins) were found attacking drought-stressed pines in Cypress Hills Inter-Provincial Park. These attacks caused red or fading trees along the edge of the forest stands.



⁶ Jane Park, Banff National Park, Warden Service, Fire and Vegetation Management

⁷ Dave Smith, Fire and Vegetation Specialist, Jasper National Park

⁸ Scott Murphy, Crew Leader and Les Weekes, Park Forest Officer, Cypress Hills Inter-Provincial Park, Cypress Hills, Alberta



Broadleaf Pests

Major Defoliators

The forest health officers (FHO) carried out aerial surveys either in late spring or in early summer to estimate the extent and severity of aspen defoliation caused by insect pests. The survey procedure is described in the "Forest Health Aerial Survey Manual" (Ranasinghe and Kominek, 1999). The observers categorized aspen defoliation as light (<35%), moderate (35-70%) or severe (>70%). The results of these surveys are summarized in Table 5 and Figure 8.

The total defoliated area in 2004 was 88% lower than the area defoliated in 2003. On one hand, the large aspen tortrix defoliation collapsed in most areas in 2004. On the other hand, forest tent caterpillar defoliated area increased in 2004 compared to 2003.



Table 5

The extent of insect-caused aspen defoliation by severity categories in Alberta, 2003 vs. 2004

Corporate Region	Gross area of defoliation (ha) ^a					
	Light	2003 Moderate	Severe	Light	2004 Moderate	Severe
Northeast	74 548	323 640	176 999	5 182	105	-
Northwest	44 491	4 399 735	0	5 567	305 933	277 419
Southwest	76 020	163 094	155 749	15 773	19 848	2 983
Total		5 414 276			632 810	

^a Total area covered by the polygons; excluding Wood Buffalo National Park



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Figure 8

The spatial distribution of insect-caused aspen defoliation by severity categories in Alberta, 2004.



Northeast Corporate Region (NE)

Fixed-wing aircraft were used in July 2004 to survey aspen stands to record insect-caused defoliation. The area defoliated decreased by about 99% in 2004 compared to the area defoliated by the large aspen tortrix in 2003. Most of the defoliation was observed south of the Thickwood Hills located southwest of Fort McMurray, along the Athabasca River (Figure 8). Groundtruthing indicated that most of the defoliation was caused by the forest tent caterpillar; some evidence of large aspen tortrix defoliation were also observed.

Northwest Corporate Region (NW)

Compared to 2003, the large aspen tortrix defoliation collapsed in most areas of this region. The gross area of large aspen tortrix defoliation was estimated at 301 675 ha. This is a 93% decrease compared to the 4 444 226 ha defoliated in 2003. Large aspen tortrix defoliation was observed in the Saddle Hills, along the Peace River near Dunvegan and in areas southwest of Grande Prairie in this region (Figure 8).

The forest tent caterpillar defoliation was observed on two distinct areas that covered 287 244 ha. In the Upper Hay (NW4) Area, the forest tent caterpillar defoliation at varying intensities was scattered over a gross area of 236 223 ha. This defoliation was found between High Level, Meander River and Chateh. Another patch with varying intensities of forest tent caterpillar defoliation was observed within a gross area of 51 021 ha in the Lesser Slave (NW2) Area. This was located northeast and east of Wabasca (Figure 8).

Southwest Corporate Region (SW)

Southern Rockies (SW1) and Clearwater (SW2) Corporate Areas

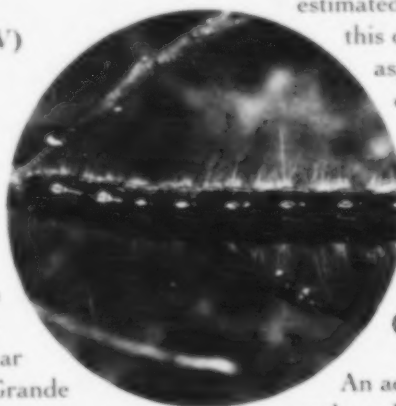
An aerial survey was conducted on July 13-14 by using a fixed-wing aircraft to assess the aspen defoliator damage. This survey focussed on the eastern edge of these corporate areas where aspen stands occur in this region. The results of the survey are shown on Figure 8.

Overall aspen defoliation was scattered over an estimated gross area of 27 792 ha. Almost all of this defoliation was attributed to the large aspen tortrix. This is an 85% decline compared to the gross defoliated area in 2003. The intensity of defoliation was light over 4 961 ha, moderate over 19 848 ha and severe over 2 983 ha (Figure 8).

Foothills (SW3) and Woodlands (SW4) Corporate Areas

An aerial survey of aspen defoliation was conducted on July 12 in these areas. The results of this survey are shown on Figure 8.

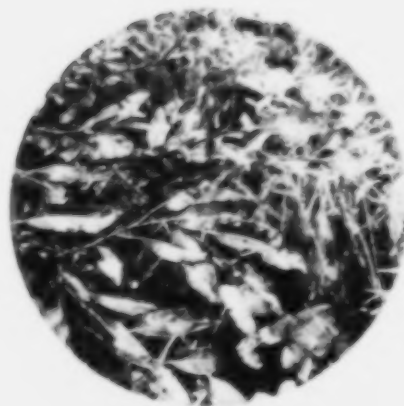
In 2004, insect-caused defoliation decreased dramatically in extent and intensity compared to 2003. Defoliation attributed to the large aspen tortrix was scattered over an estimated 10 812 ha, a 95% decline compared to the 207 199 ha defoliated in 2003. All of this year's defoliation was categorized as light compared to only 19% of the defoliation that was light in 2003.



Minor Defoliators

Willow Leafminer *Micrurapteryx salicifoliella*

A leafminer, *Micrurapteryx salicifoliella*, caused extensive defoliation on willow stands in the Northeast Region (NE). This pest was identified by Greg Pohl, the Insect Identification Officer at the Northern Forestry Centre of the Canadian Forest Service.



Ash Leaf Cone Roller *Caloptilia fraxinella* (Ely)

This pest, which is widespread in Edmonton has also been reported in the Northeast Region (NE) in Fort McMurray, Wandering River and possibly Athabasca. Ornamental ash is the primary host. The damage caused is mostly cosmetic and is not of economic importance (Pohl *et al.*, 2004).



Diseases and Disorders

Diseases

A number of diseases routinely affect forest trees in Alberta. Needle casts and rusts, dwarf mistletoe, stem cankers and rusts, stem and root decay caused by fungi, cone rusts, seedling diseases, leaf rusts and blights are among the common diseases affecting forest trees in Alberta. However, these diseases are not routinely surveyed and consequently, not reported here.

Disorders

Diebacks and Decline

Drought stress causing tree decline and kill has been found in many forested areas in the province. In the Northeast Region (NE), drought stress was less evident in 2004 compared to the previous year. However, scattered patches of tree mortality attributed to drought conditions have been observed throughout this region.

Widespread dieback occurred in the Northwest Region (NW) as well. Varying degrees of dieback from shoot mortality, branch mortality to tree mortality were found in Sexsmith, Grande Prairie, Dawson Creek and Spirit River areas. This damage was not species specific indicating either a soil- or weather-related phenomenon contributing to this damage. These die-backs and tree-kills appeared to be a net result of many factors. Most of the damaged aspen stands were in marginal condition and occurred in isolated patches in need of revival. The last forest tent caterpillar outbreak has taken its toll on these stands. This was exacerbated by drought conditions experienced in these areas during the past few years. While some pests such as poplar borer and hypoxylon canker occurred in these areas, shoot mortality was more likely caused by late spring frost. Salt damage may have caused some tree kill observed along the highways.



Frost Damage

In the Peace (NW3) and Upper Hay (NW4) areas, large-scale foliage damage observed during the aspen defoliation surveys was attributed to late spring frost and snowfall. Initially this damage was recorded with defoliation damage but groundtruthing confirmed it to be frost and snow damage.



Urban Forest Pests⁹

Edmonton's urban forest had several forest health concerns exacerbated by the drought that prevailed in the city during the past few years. The city lost over 10 000 black ash during the current drought.

The cottony psyllid, *Psyllopsis discrepans* (Flor), outbreak on black ash somewhat dwindled; this decline was attributed to temperature-induced damage to overwintering eggs. Similarly, the populations of the leafhopper, *Gypsonana* sp., first observed in Edmonton in 2003, also declined in 2004. The spiny ash sawfly, *Euparcophora parva* (Cresson), another ash pest detected in the city in 2003, was still widespread in 2004. The ash leaf cone roller, *Caloptilia fraxinella* (Ely), was also found across the city. An unidentified species of *Apanteles* parasitized the ash leaf cone roller at a relatively low level. Drought-stressed ash trees were infested by the western ash bark beetle, *Hylesinus californicus* (Swaine).

Fourteen smaller European elm bark beetles, *Scolytus multistriatus* (Marsham), were captured on sticky traps deployed in the city. This indicates a decline in their population compared to the record number of 27 beetles captured in 2003. This decline is in part attributed to the return of wetter conditions in 2004. The red elm weevil, *Magdalis armicollis* (Say), was found in elm prunings in 2004.

The hybrid poplar and wild aspen in south

Edmonton had several new, small outbreaks of the satin moth,

Leucoma salicis

(L.). In the city,

this insect is kept at

low population levels

by the native parasites.

Swedish columnar aspen in

the city had several cases of the poplar borer, *Saperda calcarata* Say.

Manitoba maple growing along the North

Saskatchewan River in Edmonton had a significant

outbreak of the large boxelder leafroller, *Archips*

negundana (Dyar).

Seventy-six new cases of Dothiorella wilt were

reported from Edmonton in 2004. Wilt-infected

prunings were composted at 60° C to kill all the stages of the causative fungus.

Black knot, a fungal disease that normally affects

cherry trees, was common in many parts of the city in 2004.



⁹ C. Saunders, M.D. Waterbe and W.B. Barr. Community Services, The City of Edmonton, Alberta



Mountain Pine Beetle Management

The mountain pine beetle management program in 2004 was composed of education and awareness, prevention, monitoring and population reduction. The provincial MPB management strategy is described in the "Mountain Pine Beetle Management Strategy" (Anon., 2002).

Parks Canada also undertook a mountain pine beetle initiative to limit the eastward spread on MPB across the continental divide region of the Mountain District National Parks. This program, aimed at reducing forest susceptibility to MPB, provided for coordination with similar programs on adjacent provincial lands.

Education and Awareness

In the summer of 2004, the West Yellowhead Mountain Pine Beetle Committee, consisting of representatives from the departments of Sustainable Resource Development and Community Development, Jasper National Park, Mount Robson Provincial Park, Canadian Forest Service and forest industry, recommended increased involvement of pilots in the detection of mountain pine beetle along the eastern slopes. The Sustainable Resource Development (SRD) designed "Be Our Eyes in the Skies" posters and business cards to improve early detection. This material was distributed to SRD staff, aircraft companies, forest industry and the general public. A toll-free beetle hotline number was also set up for individuals to report suspected beetle-attacked pine along the eastern slopes.

The mountain pine beetle brochures were also updated in 2004. This publication can be found on the external forest health web site at: http://www5.gov.ab.ca/srd/forests/health/p_posters.html

Management Guide

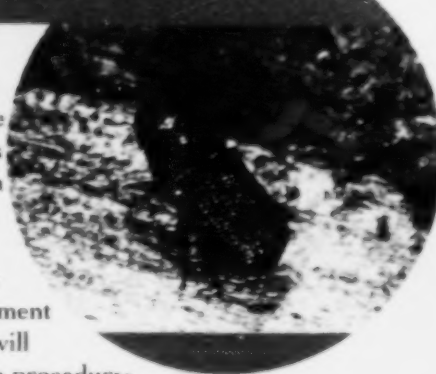
The Sustainable Resource Development (SRD) completed the "Mountain Pine Beetle Management Guide". This guide replaces the existing 1999 guide (Kominek, 1999) and it is intended to assist anyone directly involved in managing this pest in Alberta.

This comprehensive guide provides information on the different aspects of a mountain pine beetle management program and will ensure that the procedures followed during a management program will remain uniform throughout the province. This guide is revisable; periodic updates of material may be issued. To download this guide, visit the following web site: http://www5.gov.ab.ca/srd/forests/health/p_manage_mpb.html

Prevention

The Ministerial Order 16/2004, prohibited the transportation within Alberta of pine logs and forest products with bark attached, between June 1st and October 1st, 2004. Alberta's *Timber Management Regulations* under the *Forests Act* require that imported shipments of coniferous logs or forest products with bark attached are accompanied by written authorization from the Minister. Authorizing the importation of specific shipments is based on the product having a low risk of either causing or increasing the damage to forest growth by insects or diseases.

With the assistance of Alberta Transportation - Inspection Services, SRD launched a program to effectively prevent the importation of unauthorized shipments of pine with bark attached. This was carried out through regular vehicle inspections and random check-stops. Between June 01 and October 01, 2004 four unauthorized shipments were intercepted; only two of these shipments were of concern as they involved pine with bark. This is a slight increase in shipments intercepted compared to no unauthorized shipments intercepted in 2003.



Population Reduction

Municipal and Private Lands

Municipal and private land owners extended full cooperation towards the MPB control program by removing all the infested trees detected within their lands. The town of Canmore removed 70 green-attack trees and the Municipal District of Bighorn removed five green-attack trees to control the spread of the MPB. All five trees removed by the Municipal District of Bighorn were found in Harvie Heights.

The local developers removed 23 trees from Silvertip Golf Course and 30 trees from Three Sisters Mountain Village as part of the MPB control program in 2004.

Public Lands

Provincial Crown Land

Southwest Corporate Region

Southern Rockies (SW1) and Clearwater (SW2) Corporate Areas

Public Relations

The Regional FHO made 17 presentations to a variety of organizations on the proposed MPB management plan for 2004. These organizations included Fish and Game Associations; Kananaskis Country Improvement District, Municipal District of Bighorn; and staff members of Alberta Parks and Protected Areas. In addition, the FHO had 10 interviews with media representing television stations, local and national newspapers. The FHO also made a mountain pine beetle presentation at the ForestEd West Conference (a western forest education conference with delegates representing forest industry; non-profit organizations; public school teachers; academics and every level of government).

Control Program

A control plan to remove 252 green-attack trees detected in the Bow Valley in Southern Rockies (SW1) Area was developed by the regional FHO and approved by the Corporate Area Manager and the Manager, Community Development. A trained four-person crew was hired to fell and burn these green-attack trees. Each green-attack tree was felled, bucked and burned on stump. Random checks were made to ensure that no beetles survived in the burned trees. The crew completed fell and burn of all 252 green-attack trees by March 31, 2004.



In addition, an employee of Spray Lake Sawmills identified three MPB-infested trees along the headwaters of the Old Man River. The SRD crew felled and burned these trees. A follow up walk-through survey was conducted but no more infested trees were found in this area.

No green-attack trees were found in the SW2 Area.

Foothills (SW3) and Woodlands (SW4) Corporate Areas

Control Program

Four green-attack trees found in the Beaverdam Creek/Avalanche Creek area of Willmore Wilderness Park were felled and debarked by using a chainsaw. Another 21 green-attack trees found in the Meadowland Creek area of the same park were felled, bucked, slung to a nearby meadow and burned.

Federal Crown Land

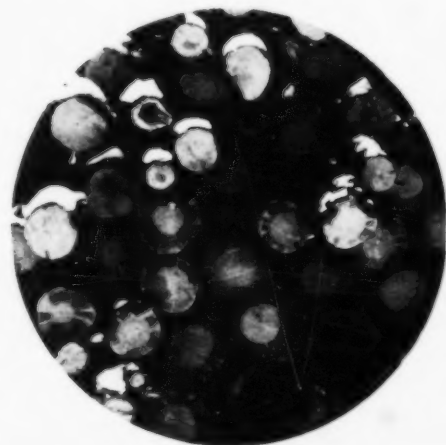
The Mountain District of Parks Canada has undertaken a long-term plan to restore a representative stand structure and reduce forest susceptibility to the MPB. This project is closely coordinated with the MPB management programs on adjacent provincial lands.



Banff National Park

Banff National Park has demarcated a monitoring zone (west of Banff Town) where MPB populations are monitored but no control action is implemented. In the management zone (east of Banff Town) action is implemented to control MPB populations.

An estimated 1 500 green-attack trees were removed from the MPB management zone that still had about 150 faders. This area was baited with aggregation pheromones to keep the beetles within the management zone.





Invasive Plants

Provincial

In 2004, the Sustainable Resource Development (SRD) Invasive Species Committee completed an Invasive Plant Strategy for the Department. The strategy positions SRD to more effectively address the impacts of invasive plants in partnership with other ministries, stakeholders, and municipalities. Based on the directions outlined in the strategy, the next steps for the Committee include:

- Drafting an SRD invasive plant action plan and communication plan;
- Assessing the data and information needs of the Department. The first step of this assessment has been completed through the invasive plant species requirements definition project;
- Seeking opportunities to create effective partnerships with other ministries, municipalities, and Alberta stakeholders.

In some areas of the province, invasive plant survey and control data were recorded using personal digital assistants (PDA). A data collection application that allows users to record information and then easily upload it to a desktop computer for analysis was developed. The first year of testing carried out in 2004 has uncovered a few system errors that will be rectified before testing continues in 2005.

Note: Scientific names of the invasive plants listed below can be found in Appendix III.

Regional

Northeast Corporate Region (NE)

In 2004 priority was given to continuing the inventory of the region's vacant Crown land in the forested area. As well, small-scale control measures were initiated on some sites identified in 2003 and on some newly noted infestations regionally. Education and Awareness was again a major component of the program in the NE Region.

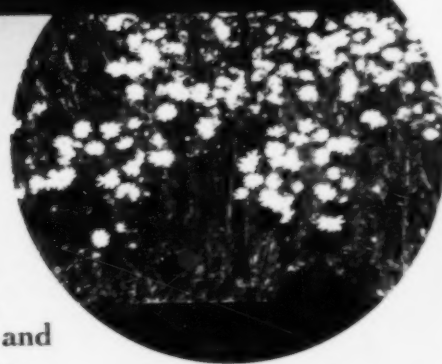
Education, Awareness and Co-operative Initiatives

One of the goals of the Northeast Regional Weed Strategy for 2002 - 2003 was to increase invasive plant awareness of SRD field staff, industry and the general public. This effort was continued in 2004 through distribution of various publications and through word-of-mouth as opportunity arose.

A mini herbarium collection of primarily noxious weeds was obtained from the Northern Alberta Institute of Technology. A plant press was constructed. The herbarium was then expanded through field collection of specimens that were missing or needed to be upgraded. This collection provides additional visual aids when conducting formal presentations.

Two Regional Weed Management Working Group sessions were held this year (Fort McMurray and Lac La Biche). Written information and hands-on samples were available to provide new members an opportunity to learn about the various species of invasive plants and their effects on the environment. During the formal presentations, information was presented dealing with both noxious weeds currently present and other plant species that may be of concern in the near future.

An information session was also held for ALPAC/ Timberline Forest Inventory Consultants in which noxious weeds were discussed. This session included the identification, biology, management and ecological impacts of noxious weeds in the Northeast Region.



When conducting invasive plant inventories, workers in the field were approached and passed information regarding invasive plants and their control. This spur of the moment approach seemed to be generally positive and allowed for a rapport to be developed at a common level between government and industry. This same approach was also used with recreational users (such as campers, off highway vehicle operators, fishermen etc.) resulting in increased knowledge on invasive plant issues both at a local and provincial scale. University of Alberta students conducting field research projects were also contacted in this manner.

All inquiries from the public were handled appropriately. The regional invasive plant program also played a role in the local community by identifying samples of weed species brought into the Athabasca office by residents and co-workers.

In 2004, there were no co-operative initiatives reported in this region.

Surveys and Control

Of the 379 sites inventoried, 262 (62%) were found to have noxious weed infestations (in comparison to 72% in 2003 and 62% in 2002). When categorizing these sites by the degree of infestation, 37% were trace, 28% low, 19% moderate and 16% high. In 2003 the corresponding percentages were 40%, 33%, 18% and 8% respectively.

On the 262 sites found to have weeds, 53 (20 %) had multiple weed species.

A continuation of frequency of species varying regionally was consistent with 2003 results. Canada thistle, ox-eye daisy and tall buttercup were primarily found in the southern part of the region. Perennial sow-thistle was noted extensively throughout the region this year to such an extent that individual inventories were not recorded. Almost every main highway, secondary highway, and major access roads showed some degree of perennial sow-thistle infestation.

Frequency of weed species on recorded inventories were (in order from highest to lowest):

Perennial sow-thistle	48%
Scentless chamomile	32%
Common tansy	23%
Canada thistle	16%
Tall buttercup	8%
Ox-eye daisy	5%
White cockle	>1%
Leafy spurge	>1%
Blueweed	>1%

(Note: Due to multiple species occurring as some sites, the total is greater than 100%)



Hand-picking of small infestations was conducted at 83 locations. Targeted species included primarily scentless chamomile as well as common tansy, Canada thistle, ox-eye daisy, tall buttercup, perennial sow-thistle and white cockle.

Highest control priority was given to smaller infestations to prevent new areas of weed establishment. The hand-picking of these smaller infestations was conducted regardless of who the disposition holder was.

One large-scale control project was conducted by SRD in 2004. This involved hand-picking approximately 3 000 scentless chamomile plants near Kearle Lake, northeast of Fort McMurray. All weeds hand-picked by SRD staff were incinerated October 14, 2004 at the Wandering River Ranger Station.

Five "pilot project" areas were also established to test the efficacy of hand pulling and and/or cutting on different weed species. These areas will be checked in 2005. The objective is to determine if non-chemical control can be effective for sensitive areas, and establish how much such measures will cost.



Northwest Corporate Region (NW)

Education, Awareness and Co-operative Initiatives

An invasive plant awareness workshop was held in Grande Prairie in April of 2004 through the cooperative efforts of local municipalities and SRD. The attendance was at a record level and plans are being made for another workshop this spring (2005). A similar workshop was held in High Level in April through the cooperative efforts of the Municipal District of Mackenzie and SRD staff. This workshop was not well attended as only a few industry representatives participated.

In 2004, invasive plant management programs were implemented in cooperation with local municipalities within the Smoky (NW1), Peace (NW3) and Upper Hay (NW4) areas. The priorities of each program were to improve invasive plant monitoring and detection within the Green Area and to improve stakeholder compliance in regards to invasive plant management on dispositions held.

Surveys and Control

In 2004 invasive plant surveys and control were conducted throughout the region. A summary of the survey results is shown in Table 6.

Within the NW1 Area, between June and September, invasive plant surveys at 292 sites were conducted by the SRD staff. The most prevalent species found was scentless chamomile, which was recorded on 36.3% of the sites. Other species found were perennial sow-thistle, Canada thistle, ox-eye daisy, common tansy, toadflax and tall buttercup. Multiple species were found on 12.3% of the 292 sites.

A small control program for Canada thistle was completed within three areas of the NW1 Area in 2004. A contractor was hired to treat two small infestations located on vacant Crown land and one large infestation within a grazing lease. Tordon 101® was used at an application rate of 7.0 litres per hectare. Post treatment inspections indicated a mixed level of control as some Canada thistle plants within

the treated areas had significant mortality and others showed only visible damage but not mortality.

Within the NW4 Area, SRD staff conducted invasive plant surveys through July and August; altogether 430 sites were inspected. The most prevalent species found was perennial sow-thistle, which was recorded on 70.7% of the sites. Other species recorded were scentless chamomile, common tansy, and Canada thistle. Multiple species were found on 10.9% of the 430 sites.

Within the NW3 Area, between June and September, invasive plant surveys were conducted at 1 756 sites by the Northern Sunrise County, Municipal District of Northern Lights, Municipal District of Clear Hills and SRD staff. The most prevalent species found was perennial sow-thistle, which was recorded on 34.5% of the sites. Other species recorded were scentless chamomile, Canada thistle, ox-eye daisy and common tansy. Multiple species were found on 6.5% of the 1 756 sites.

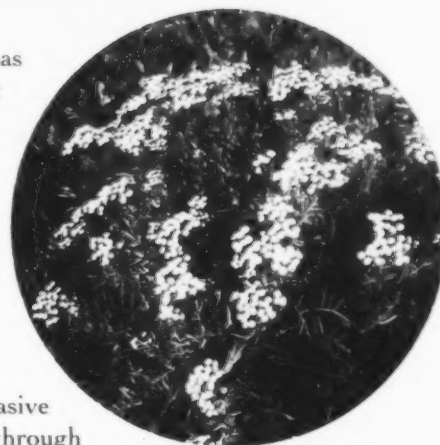


Table 6

Results of 2004 Invasive Plant Surveys within the NW Region

Area	No Weeds Present	Perennial sow-thistle	Scentless chamomile	Canada thistle	Ox-eye daisy	Common tansy	Toadflax	Tall buttercup
NW1	36.60%	5.50%	36.30%	27.10%	1.00%	3.80%	2.10%	0.30%
NW3	49.60%	34.5%	14.80%	8.70%	0.30%	0.10%		
NW4	10.70%	70.70%	17.40%	0.70%		0.50%		

Note: Due to multiple species occurring at some sites, some totals may be greater than 100%.

Southwest Corporate Region (SW)

Southern Rockies (SW1) and Clearwater (SW2) Corporate Areas

In southern Alberta, the spring of 2004 was cool and wet, but warmer temperatures arrived late June and lasted through July. Afternoon thunderstorms provided regular moisture. By August the cooler temperatures and rainy weather returned, lasting into early September. The prolonged cool periods did not seem to negatively impact invasive plant growth, and ample precipitation allowed tall buttercup to rebound. By late summer, many areas were becoming blankets of weed seedlings, particularly with wild caraway.

This year, the invasive plant program set control and survey priorities for the SW1 and SW2 areas. The program objectives were to:

- Eradicate restricted weed infestations;
- Contain and control (reduce abundance & density) noxious weed infestations;
- Control and eradicate isolated noxious weed infestations where feasible;
- Reduce herbicide costs and impacts on the environment;
- Maximum stakeholder participation in cooperation, prevention, treatment, and inventory;

- Increase invasive plant awareness and stewardship of public lands through increased education;
- Protect economic and ecological values on public lands from the damage caused by invasive plant invasions.

To achieve these objectives, the following priorities for invasive plant management were adopted:

1. Co-operative management areas - primarily where stakeholder participation has been greatest.
2. 2001-2003 wildfire areas not being managed by the Forest Protection Division (FPD) - using previous invasive plant inventories, attempt to differentiate between existing infestation boundaries, invasive plant spread due to fire line activities, and new invasive plant species introduced by fire line reclamation or timber salvage operations.
3. Invasive plant infested recreation areas on SRD lands - emphasis on containment and staging areas.

Thirty-six per cent of the budget was allotted to the SW2 Area, and 54% to the SW1 Area. The remaining 10% of the total budget was allotted to education. Within each area, the budget was then allotted to survey and control. Additionally, the Forest Protection Division provided funds for invasive plant survey and control in recent fire suppression areas.



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Education, Awareness and Co-operative Initiatives

A large, multi-stakeholder project involving approximately two and one half townships finally came to fruition. Leaseholders participating in the project included Fortis Alberta, Calpine Canada Resources, Fairbourne Energy, Husky Oil, Sundance Forest Industries Ltd., and Northrock Resources. Each company treated the tall buttercup on their leases and SRD treated all of the adjacent, vacant Crown land that was infested. A very thorough and effective kill had been achieved. Hopefully good residual control will be seen in 2005.

Other co-operative ventures included working with BP Canada Energy Corp., Petro Canada, Spray Lake Sawmills, and Devon Energy Corp.

A Memorandum of Understanding was established with the Municipal District (MD) of Ranchland to direct and manage weeds on SRD land within the MD.

Surveys and Control

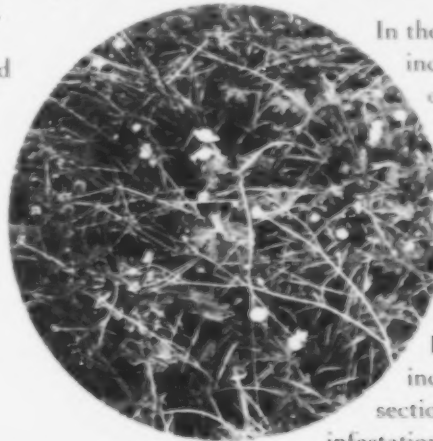
The following survey and control information for SW2 and SW1 areas is reported based on the geographic areas designated as Clearwater, Kananaskis, Livingstone, Castle, Porcupine Hills, and the Lost Creek Fire.

In the SW2 Area, the Owl River tall buttercup cooperative project was the first priority. After its completion, poor weather made additional spraying difficult. Since the buttercup had flourished with the wet weather, the program focus shifted to the backcountry of the Blackstone. The contractor used horses to access these sites.

In Kananaskis, early season surveys of field scabious in the Sibbald and Jumping Pound areas showed a tremendous improvement. Areas that had been infested with the weed had only about 10% of what was there last year. Picloram® has always been an effective herbicide to control field scabious, although

Transline® (metsulfuron-methyl) was used almost exclusively in the Sibbald Flats because of the tall larkspur. Transline® is a non-residual, broadleaf herbicide. Despite this fact, many native broadleaf plants were present this year and the almost total absence of weed in areas treated in 2003 was remarkable.

Only a few of the known sites in the MacLean Creek off-highway vehicle area in Kananaskis were revisited this year. A scentless chamomile site and a wild caraway site looked much better than last year. The few existing plants along the trail were hand-pulled.



In the south Kananaskis, there was an increase in scentless chamomile and ox-eye daisy alongside Highway 4. One spotted knapweed plant was discovered and pulled from alongside the Cat Creek Bridge. Spotted knapweed plants were also discovered on the Highwood River bank in the Sentinel campground.

In the Livingstone, tall buttercup increased significantly along northern sections of the trunk road. Many of the infestations remained marshy all season, and therefore could not be treated. Ox-eye daisy continues to infest the Gap area, lining the banks of Daisy Creek and the Oldman River.

Several small, but blooming spotted knapweed bolts were pulled from a random campsite in the Bob Creek Wildland area of the Livingstone. A few other known spotted knapweed sites sprang back to life and the plants were all hand-pulled.

The western portion of Dutch Creek Road and the entire length of Atlas Haul Road in the Livingstone are thoroughly infested with ox-eye daisy. These weeds continue to spread into the regenerated cutblocks. Future harvesting locations to the north will likely become infested as well, as increased access may lead to more recreational activity.



In the Castle, ox-eye daisy lines the banks of Lyons and Lynx creeks for nearly their entire length. This plant's presence is also increasing dramatically in the Carbondale and Lost Creek areas. Toadflax is very prominent in the burned areas on the flats along Lynx Creek. Timber salvage in the fire area was a major contributor to invasive plant spread this season as haul roads and equipment traversed existing infestations. With the forest canopy gone, there is likely to be an explosion of ox-eye daisy and tall buttercup throughout the area.

West of the Castle ski hill, a new orange hawkweed site was discovered. The toadflax transect in that area was re-sampled and looked much better after being treated late last season. The old and unreclaimed mine tailings/pits in the York Creek area remain heavily infested with ox-eye daisy and toadflax.

In the South Castle area, most of the handful of known weed sites persisted but were improving. One new bladder campion patch was found. The Spionkop and Yarrow Creek roads in the very south were surveyed and found to be clean, except for a bit of Canada thistle.

In the Porcupine area there was a decrease in the number of hound's-tongue plants in Beaver Creek. This was the second year that bolting plants were pulled (to remove the burred seed) and rosettes were sprayed. There was also a decrease in the wild caraway and dalmatian toadflax observed in the area. In the southeast Porcupine, some areas have fewer hound's-tongue plants than before, but the plant is readily infesting new sites.

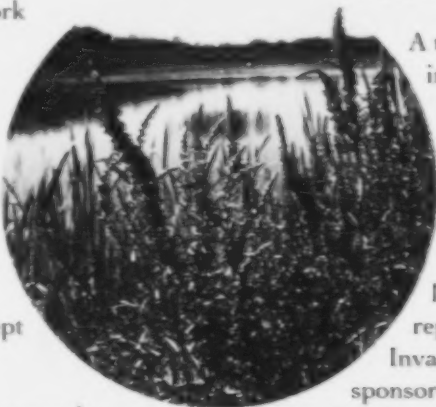
In the Lost Creek Fire area, the entire newly constructed fireguard was surveyed. Desirable vegetation re-bounded well on nearly all of the camps and heavy equipment staging areas. Poorly competitive 'pasture' weeds were also present at most sites, but these will likely be replaced by native vegetation over time. However, fireguards in the Carbondale/Lost Creek area are another story. The high degree of recreational use in this area has already

aided in the proliferation and spread of several noxious weeds.

Woodlands (SW4) and Foothills (SW3) Corporate Areas

Education, Awareness and Co-operative Initiatives

Within the SW3 Area, the main focus of the 2004 program was on a two-year multi-stakeholder management program that began in 2003. Each participant in the program was to submit a Weed Control Plan and was expected to inspect sites and provide SRD with the inventory and any control information gathered.



A total of 27 companies supplied 302 invasive plant inspection reports. SRD and Yellowhead County staff inspected an additional 307 sites jointly. A database was created using company and SRD information.

In 2004, the FHO coordinated the reprinting and distribution of the Invasive Plants Awareness Brochure sponsored by SRD; Alberta Agriculture, Food and Rural Development; Yellowhead County; Woodlands County; Brazeau County; Municipal District (M.D.) of Greenview, and M.D. of Big Lakes. This brochure assists in the identification of common invasive plants in Alberta.

Surveys and Control

The overall goal of the 2004 Invasive Plant Program in the SW4 Area was the identification of sites infested with invasive plants, and control on these sites. Communication with disposition holders was integral to ensuring the success of this goal. In total 115 infested sites were documented and entered into the Woodlands Area Invasive Plants Database.

This year several Crown sites were identified as having invasive plant infestations. Hand-picking and mowing were used to control invasive plants at the



Fox Creek Ranger Station and Man-up Base, and along the Whitecourt Mountain Tower Road. The Whitecourt Junior Forest Ranger Crew hand-picked an area of Canada thistle within the Heustis Demonstration Forest.

Canada thistle at the Whitecourt Mountain Genetics Site was controlled through herbicide application.

Spotted knapweed was located in a gravel pit along Highway 947. The plants were sprayed three times in the summer of 2004 with Tordon 101®. Previous herbicide applications did not provide 100% kill, which has lead to spread. The Municipal District of Greenview issued a stop order that restricts movement of material from the site for at least one year.

Frequency of occurrence of invasive plants species on inspected sites:

Ox-eye daisy	13%
Tall buttercup	11%
Scentless chamomile	10%
Canada thistle	2.4%

Common tansy 1.3%

Perennial sow-thistle 0.4%

Within the SW3 Area, invasive plant control occurred at 11 areas. Table 7 provides the control details.



Table 7

2004 Invasive Plant Control Methods for Foothills Corporate Area.

Location	Type of Control	Target Species
Peppers Lake	Mowed	tall buttercup
Chip Lake	Picked	scentless chamomile
NE 8 51 10 W5 (old mill)	Picked	scentless chamomile
National Interpretive Park	Picked	common tansy, scentless chamomile
Pedley Gravel Pit (2 sites)	Picked	perennial sow-thistle, ox-eye daisy
Rock Lake Staging Area (3 sites)	Picked	tall buttercup, ox-eye daisy
Wild Hay Group Camp	Picked	tall buttercup, ox-eye daisy
Gregg Cabin	Mowed	tall buttercup
Big Horn Trail Kiosk (Gregg River rd)	Picked	ox-eye daisy
Petite Lakes Campground	Picked	ox-eye daisy
Triumviante Road Cutblock	Spray and Picked	common tansy, tall buttercup, ox-eye daisy, Canada thistle



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Frequency of occurrence of invasive plants species on inspected sites:

Ox-eye daisy	15%
Tall buttercup	11%
Scentless chamomile	10%
Canada thistle	2.4%

Common tansy 1.5%

Perennial sow-thistle 0.4%

Within the SW5 Area, invasive plant control occurred at 11 areas. Table 7 provides the control details.



Table 7

2004 Invasive Plant Control Methods for Foothills Corporate Area.

Location	Type of Control	Target Species
Peppers Lake	Mowed	tall buttercup
Chip Lake	Picked	scentless chamomile
NE 8 51 10 W5 (old mill)	Picked	scentless chamomile
National Interpretive Park	Picked	common tansy, scentless chamomile
Pedley Gravel Pit (2 sites)	Picked	perennial sow-thistle, ox-eye daisy
Rock Lake Staging Area (3 sites)	Picked	tall buttercup, ox-eye daisy
Wild Hay Group Camp	Picked	tall buttercup, ox-eye daisy
Gregg Cabin	Mowed	tall buttercup
Big Horn Trail Kiosk (Gregg River rd)	Picked	ox-eye daisy
Petite Lakes Campground	Picked	ox-eye daisy
Triumviante Road Cutblock	Spray and Picked	common tansy, tall buttercup, ox-eye daisy, Canada thistle



Cypress Hills Inter-Provincial Park

Surveys and Control

Moderately cool and wet weather appeared to favour Canada thistle in numerous areas throughout Cypress Hills Inter-Provincial Park. Infestations of Canada thistle appeared to be increasing.

Ox-eye daisy remains well established on Ferguson Hill road and one resource trail. Tall buttercup remains well established in many areas of the Park. Several patches of toadflax were found over approximately 2.2 ha along Murray Hill Road. Work crews did successfully pull toadflax from these areas, which will be surveyed again in 2005.

While weed control budgets are virtually non-existent in the Park, staff will complete detailed planning over the winter for implementation in 2005. We will continue to work with the Cypress County Fieldman.



Forecast on Major Forest Pests for 2005

Spruce Budworm

The male spruce budworm populations were monitored provincewide by using Multi-Pher I® traps (Le Groupe Biocontrôle, Quebec) baited with female budworm sex pheromone lures (Plastic lure, Phero Tech Inc., B.C.). The procedure for deploying these traps is described in the "Spruce Budworm Management Guide" (Ranasinghe and Kominek, 1998). The trap catches are used to predict the risk of new outbreaks occurring in the near future at or near the trap sites. The predictions based on the moth catches in pheromone-baited traps are shown in Figure 9.

Altogether 178 plots were set up across provincially managed forested land to monitor the spruce budworm male moth populations. Four plots with disturbed traps were dropped from the analysis. Overall, the risk of new spruce budworm outbreaks occurring in 2005 in the province dropped considerably compared to the risk in 2004. Only eight plots (4.6%) had average moth catches indicating a high risk of outbreaks occurring. The risk of outbreaks occurring was moderate in 39 plots (22.4%) and low in 127 plots (73%).

Northeast Corporate Region (NE)

Fifty plots were set up in this region. Twenty-eight plots were located in the Lac La Biche (NE1) Area and 22 were located in the Waterways (NE2) Area.

The risk of new outbreaks occurring was low in 24 plots (86%) and moderate in four plots (14%) in the NE1 Area. No plot had a high risk of an outbreak occurring in 2005. This is a further decline in the risk of outbreaks compared to 2004 when three plots in this area had high risk of outbreaks.

In the NE2 Area, the risk of outbreaks occurring was high in 6 plots (28.6%), moderate in 13 plots (61.9%) and low in 2 plots (9.5%); traps in one plot were disturbed and excluded from analysis. A similar trend was observed in this area in 2003. This is the only area in the province with a high risk of spruce budworm outbreaks occurring in the near future. Most of the high risk plots were located near Fort

McMurray, which is bracing for a serious budworm outbreak in 2005 (Figure 9).



Northwest Corporate Region (NW)

Ninety-seven plots were set up in this region; traps at three sites were disturbed and excluded from consideration. These plots were distributed as follows in the corporate areas of Smoky (NW1) - 9; Lesser Slave (NW2) - 16; Peace (NW3) - 24 and Upper Hay (NW4) - 48.

In the NW1 Area, risk was low in eight plots (89%) and moderate in one plot (11%). Similarly, in the NW2 Area, risk was low in 14 plots (87.5%) and moderate in two plots (12.5%). The risk was very low in the NW3 Area where all 23 plots (100%) had low risk and one plot was disturbed. The risk of new outbreaks occurring in these areas was either as low or lower than what was reported in 2003. In the NW4 Area, risk was low in 35 plots (76%), moderate in 10 plots (22%) and high in one plot (2%); two plot sites in this area were disturbed. The plot with a high risk was located near Zama City. The risk of new outbreaks occurring has continued to decrease in this area. In comparison, eight plots (36%) had high risk of outbreaks in the NW4 Area in 2004.

Overall, spruce budworm outbreak is expected to collapse in this region in 2005. The tree-kill observed in 2004 in some repeatedly defoliated stands is expected to continue for another year or two even if the budworm populations collapse in 2005.



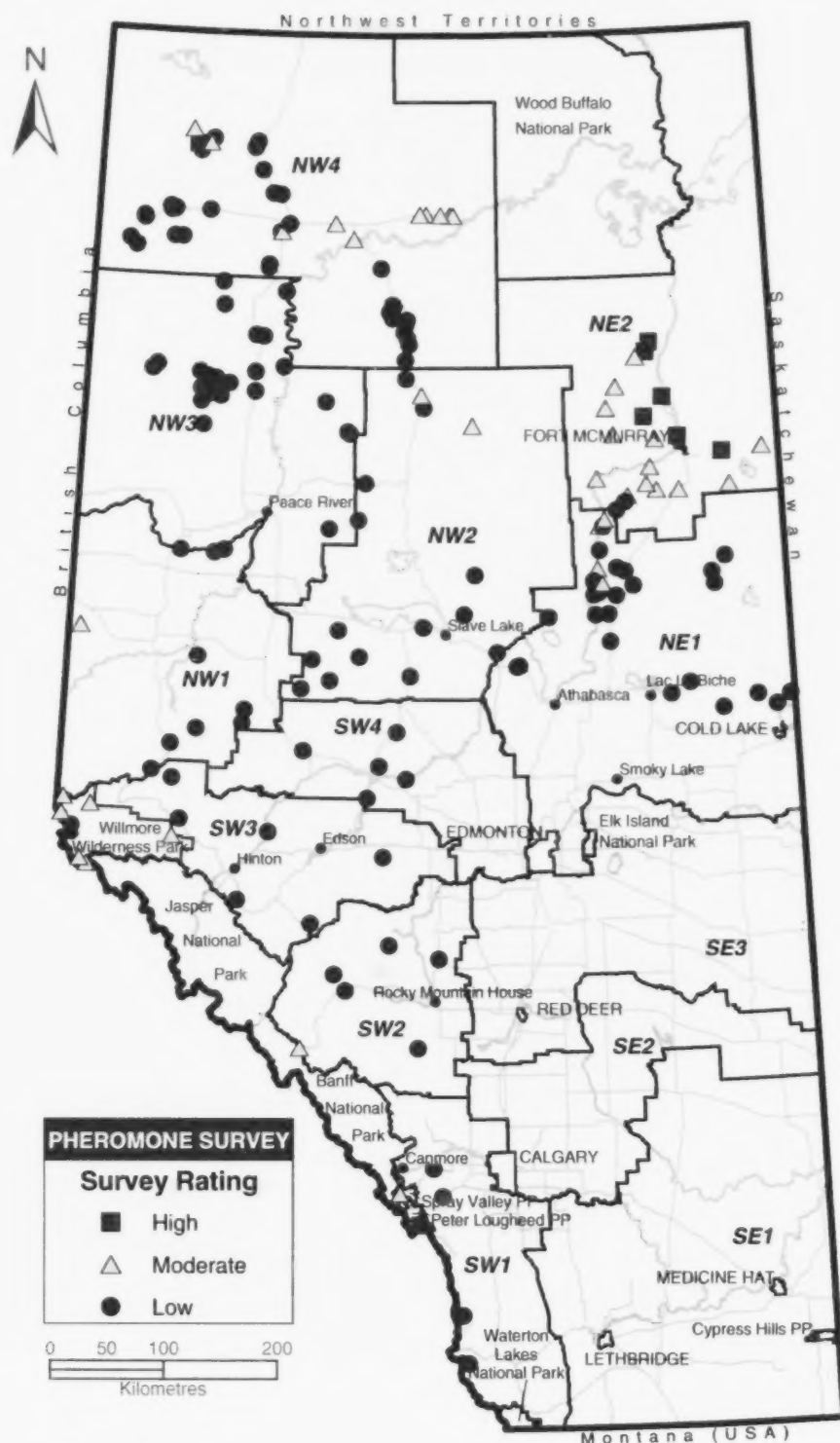


Figure 9

Forecast on risk of new spruce budworm outbreaks occurring in 2005, based on the number of male moths captured in pheromone-baited traps deployed in 2004 in Alberta.



Southwest Corporate Region (SW)

Thirty-one plots were established in this region in 2004. These plots were distributed as follows among the corporate areas of Southern Rockies (SW1) - 6; Clearwater (SW2) - 6; Foothills (SW3) - 14 and Woodlands (SW4) - 5. Some of these plots, especially those located at high altitudes, are inhabited by the two-year cycle budworm, *C. biennis* Free. Thus the moth catches alternate between high numbers found in even years with the low numbers found in odd years. Consequently, the moth catch in a given year is used to predict the risk of outbreaks occurring two years later.

As predicted in 2002, moth catches were relatively high in 2004; these ranged from 3 to 2 966 moths per trap. In comparison, moth catches ranged from 0 - 438¹⁰ moths per trap in 2003. In the SW1 Area risk of new outbreaks occurring was low in four plots (66.7%), moderate in one plot (16.7%) and high in one plot (16.7%). The plot with a high risk was located in Kananaskis Country where unconfirmed budworm defoliation was reported in 2004. High trap catches were found in this plot in 2002 as well. The plot with a moderate risk of an outbreak in 2004 also had high moth catches in 2002. Risk of budworm outbreaks was low in the SW4 Area and varied from low to moderate in SW2 and SW3 areas.

New spruce budworm outbreak is likely to occur in Kananaskis Country in 2006 if the present trend continues in this region.

Exotic Pests

The Public Lands and Forests Division of the SRD set up 74 traps as a part of the annual gypsy moth detection program conducted by the Canadian Food Inspection Agency (CFIA). Delta traps baited with Dispalure® were used. No gypsy moths were caught in these traps. However, the Canadian Forest Service, Northern Forestry Centre caught one gypsy moth in a trap set up under this program at Lake Louise in Banff National Park. Gypsy moth is the most likely exotic pest to occur in Alberta in view of occasional trapping of this insect, albeit in very low numbers, in the province. Increased awareness and vigilance

towards timely detection are the keys to manage these pests.

Mountain Pine Beetle

Barring inclement weather conditions such as severe cold weather (-30 °C) occurring either towards the end of 2004/05 winter or in 2005 early spring, new MPB infestations are likely to occur in areas close to the Alberta-B.C. border in the Smoky Area (NW1), Willmore Wilderness Park, Jasper National Park, Banff National Park, Canmore, Kananaskis Country and Crowsnest Pass. Mountain pine beetle infestations already occur on B.C. side of these areas (Figure 10). In Banff National Park, the risk of new MPB infestations in Lake Louise area has increased because of increasing populations in Yoho National Park.

As well, recent U.S. Forest Service survey reports show presence of MPB infestations close to Canada-U.S. border between Alberta and Montana. Potential MPB infestations in Waterton National Park have to be anticipated in view of beetle build-up in Montana.

Aspen Defoliators

In 2005, forest tent caterpillar populations are expected to expand in northern Alberta. The large aspen tortrix populations will continue to decline in 2005.

Historically, large aspen tortrix populations have collapsed after 3-4 years. These population collapses of the large aspen tortrix are usually followed by an expansion of the forest tent caterpillar populations. In 2004 this "switch over" of aspen defoliators appears to have occurred.

Spruce Beetle

Spruce beetle, *Dendroctonus rufipennis* (Kirby) outbreaks are likely in areas affected by the current spruce budworm infestation if an event that promotes spruce beetle population (blow-down, large slash piles) occurs in northern Alberta. This is because the prolonged spruce budworm infestation has stressed large tracts of mature white spruce making them prone to secondary pests such as the spruce beetle.

¹⁰ This figure was incorrectly reported as 0 - 422 per trap in 2003 Annual Report



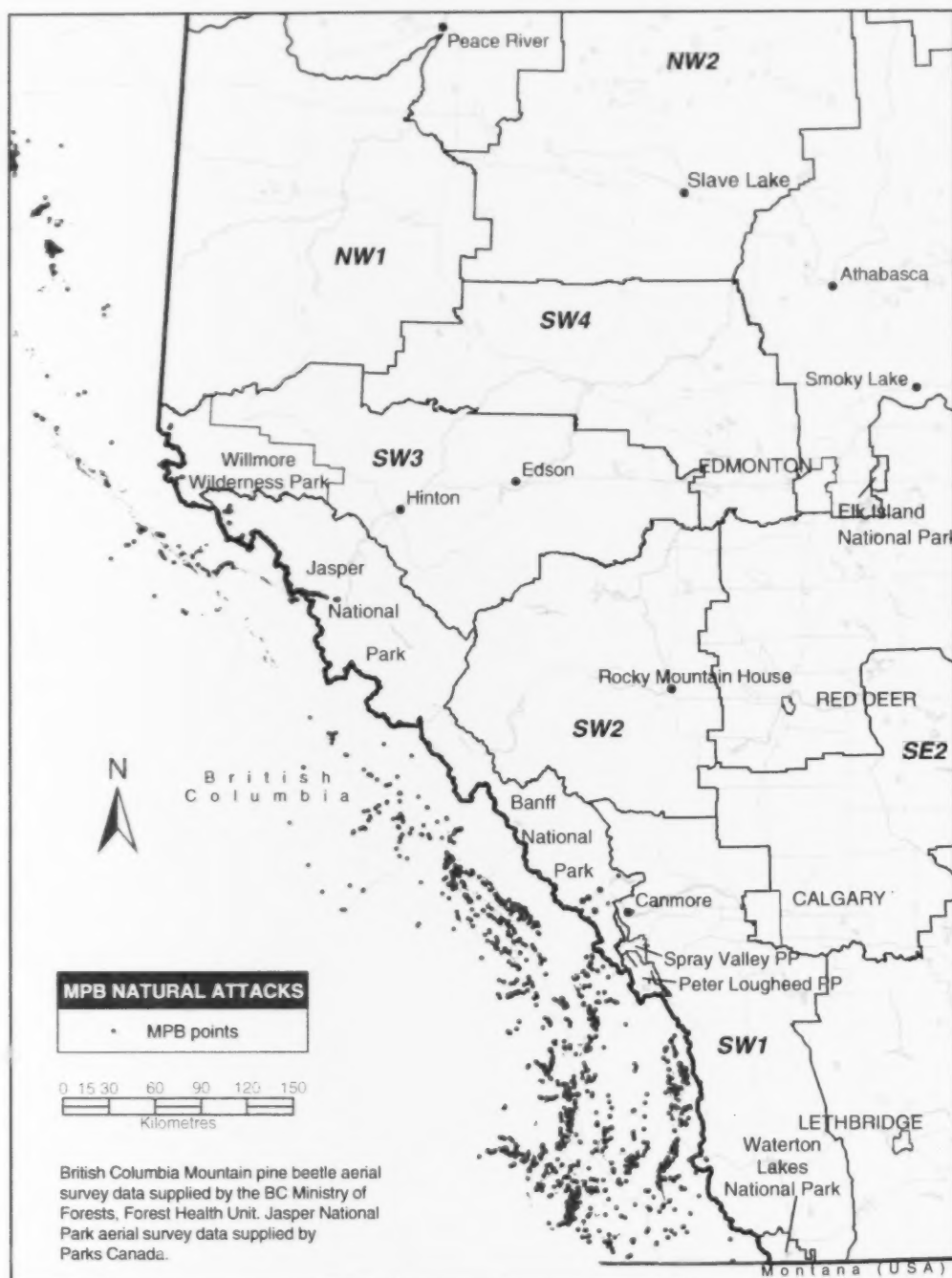


Figure 10

Incidence of mountain pine beetle infestations in Alberta and along the Alberta-B.C. border areas, 2004.

General Education, Awareness and Training

Provincial

Provincial Integrated Pest Management Forum

The 8th annual Provincial Integrated Pest Management Forum was held on November 5, 2004 at the Northern Forestry Centre, Canadian Forest Service in Edmonton. It was well received by 42 attendees from research and educational institutions, government and the forest industry. Topics included current pest conditions, mountain pine beetle operations and research, Armillaria root disease survey methodology, exotic pest updates and the latest forest health research. Presentations from the forum can be viewed on the forest health web site at: http://www3.gov.ab.ca/srd/forests/health/coop_ipm.html

Forest Health Web Site

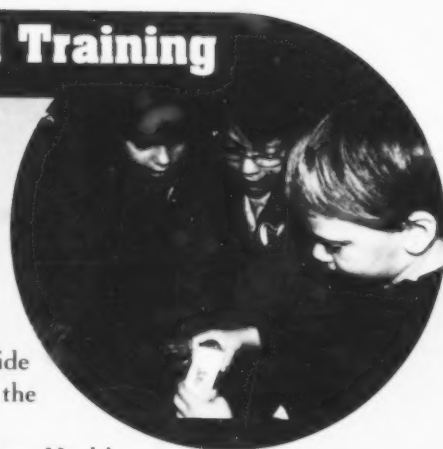
In 2004, both the internal and external forest health web sites were regularly updated. Some of the highlights included the Mountain Pine Beetle Management Guide; the large aspen tortrix information page; invasive plants information sheets; "Alberta forest health strategy and shared roles and responsibilities between SRD and the forest industry" document; the Provincial Integrated Pest Management Forum web page; and the Forest Pest Damage Diagnostic System. Other regular updates included forest health conditions and maps; newsletters and publications; annual reports; survey data; and mountain pine beetle updates on the "pest alert" section. The external web site address is: <http://www3.gov.ab.ca/srd/forests/health/index.html>

Forest Pest Damage Diagnostic System

The Forest Pest Damage Diagnostic System was posted this year on the Forest Health external website thus making it available for use by forest industry and other external users. We will continue to upgrade this system with a view of making it accessible through wireless devices. The external web site address is: <http://www3.gov.ab.ca/srd/forests/health/diagnostic.html>

Teacher's Guide

In 2004, the Teacher's Utilization Guide to compliment the "Envirokids Investigate Forest Health Activity Book" was completed. This guide provides tools for teachers to bring the topics of forest ecology and forest health into the grade 6 and 7 classrooms. The teacher's guide and the revised activity book are available on the forest health web site at: http://www3.gov.ab.ca/srd/forests/health/p_posters.html



Regional

Northeast Corporate Region (NE)

The regional FHO carried out the following to provide education, training and increase awareness on forest health in the region:

- Setting up a forest health display for the National Forestry Week;
- Conducting two weed management workshops;
- Making presentations to the divisional staff and Provincial Junior Forest Wardens;
- Conducting a forest health workshop for ALPAC Forest Products staff;
- Interactive presentations and short field tours given to campers at the Long Lake Junior Forest Wardens Camp. These presentations were tied into presentations that dealt with other Forest Health issues.



Northwest Corporate Region (NW)

A forest health workshop which also included invasive plants was held in May 2004, for the staff of Vanderwell Contractors Limited. In late 2004, MPB awareness presentations were made for the benefit of the public advisory groups of Weyerhaeuser (Grande Prairie) and Tolko Industries Ltd. (Slave Lake).

Southwest Corporate Region (SW)

Southern Rockies (SW1) and Clearwater (SW2) Corporate Areas

In the SW1 area, the regional FHO trained staff from Spray Lake Sawmills, Sunpine Forest Products Ltd., contractors and a variety of education groups in the region on forest health-related matters.

Foothills (SW3) and Woodlands (SW4) Corporate Areas

A new pamphlet-holder display area at the Berland River Recreation Area was built. This outdoor information centre provides recreation users with brochures on such topics as invasive plants, mountain pine beetle awareness and fire safety. Similar display areas have been built at staging areas at Sulphur Gates, Whitehorse Creek and Rock Lake.



Research and Development

Armillaria Root Disease

The Forest Health Group was instrumental in assembling a team to address the issues related to increasing concerns over the impact of *Armillaria* root disease on forest stands. This team is composed of representatives from the academic, research, forest industry and forest management areas. Under this initiative, Dr. Peter Blenis (University of Alberta) is finalizing a research proposal to study the potential impact of wildfire intensity on incidence of *Armillaria* in regeneration growing on wildfire-killed forest stands. This proposal will be submitted to Alberta Forest Research Initiative and other donors for funding.

As part of the *Armillaria* Root Disease Initiative, the regional FHO (Woodlands and Foothills Corporate Areas) and a provincial staff member visited one of the impact monitoring study areas located near Cynthia in central Alberta. This area was planted in 1990. The last assessment was carried out in 1999. During the past five years, only four trees (1.8%) were killed by *Armillaria* root disease in this study area. The remaining trees appeared healthy with vigorous growth. This indicates a slowing down of tree mortality rate due to *Armillaria* with increase in the age of the stand.

Forest Tent Caterpillar Pheromone Study

Unitraps[®] baited with pheromone lures (Phero Tech Inc., B.C.) were deployed in 25 plots in the NE Region and in 20 plots in the NW Region. The objective was to study the use of these lures to predict onset of forest tent caterpillar outbreaks and defoliation levels. In the NE Region, the average trap catch in the plots ranged from 4-103 moths per trap; in the NW Region, the range was 2-37 moths per trap. Between 2003 and 2004, the overall average moths per trap decreased in the NE Region but remained about the same in the NW Region. There was no defoliation in any of the plots. In the NW, moths of the large aspen tortrix and aspen two leaf tier also were found in these traps. In the NE Region aspen two leaf tier moths were found in almost all the traps. However, the maximum number of two leaf tier moths per trap declined from 827 in 2003 to 281 moths in 2004.



Woodborer Study

The second-year component of this project was completed in 2004. The remaining sample trees in the study plots were harvested and processed by repeating the procedure outlined in the 2003 Forest Health Annual Report. The woodborer damage was more evident and abundant in the second-year logs, as expected. Early indications are that the larger diameter logs still yielded sound lumber in spite of damage due to fire and woodborers. The data from this field trial are being summarized for analysis.

Biological Control of Scentless Chamomile

In the Southwest Corporate Region, there were no further releases of the two biological control insects, scentless chamomile gall midge (*Rhopalomyia* sp.) and the seedpod weevil (*Omphalapion bookeri*) to control scentless chamomile this year. The seedpod weevils still maintain a viable population after 3 years of being released. Evidence of their existence can be found by the half eaten flower buds.

The gall midges released in the summer of 2002 in the Entwistle Public Gravel Pit have also shown viable populations. Stunted and deformed plants have decreased seed productivity levels, which will further decrease as the midge population increases.

However, to-date the control achieved by these biological control agents is rather limited and confined to a slight decrease in chamomile population at these sites.



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- Saunders, C., Wartenbe, M.D. and Barr, W.B. 2004. Summary of observations on urban forest pest problems in Edmonton, 2004, Unpublished report, Community Services, City of Edmonton, AB.



Appendixes

Appendix I

Corporate Regions and Areas of Alberta, 2004



References

- Anon. 2002. Mountain pine beetle management strategy. Alberta Sustainable Resource Development, Lands and Forests Division, Forest Management Branch, Forest Health Section, Edmonton AB.
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Appendixes

Appendix I

Corporate Regions and Areas of Alberta, 2004



Appendix II

Information on Operational Use of Pheromones in Alberta, 2004

Forest Tent Caterpillar

Chemical component(s):	Z5, E7 - dodecadienal
Lure type:	Flexlure®
Trap type:	Uni-trap®
Pheromone source:	Phero Tech Inc., Delta, British Columbia

Gypsy Moth

Chemical component(s):	(+)-cis-7, 8-epoxy-2-methyloctadecane
Lure type:	Disparlure®
Trap:	Delta sticky trap
Pheromone source:	Trécé Inc., Salinas, California (purchased and distributed by Canadian Food Inspection Agency)

Mountain Pine Beetle

Chemical component(s):	trans-verbenol, exo-brevicomin
Lure type:	Pre-packed tree-bait
Trap:	not applicable
Pheromone source:	Phero Tech Inc., Delta, British Columbia

Spruce Budworm

Chemical component(s):	95% E-11-tetradecenal, 5% Z-11-tetradecenal
Lure type:	Plastic lure
Trap type:	Multi-Pher I®
Pheromone source:	Phero Tech Inc., Delta, British Columbia



Appendix III

Scientific Names of Invasive Plant Species

- Bladder campion - *Silene cucubalus* Wibel
 Blueweed - *Echium vulgare* L.
 Canada thistle - *Cirsium arvense* (L.) Scop.
 Common tansy - *Tanacetum vulgare* L.
 Toadflax - *Linaria vulgaris* Hill.
 Dalmatian toadflax - *Linaria dalmatica* (L.) Mill.
 Field scabious - *Knautia arvensis* (L.) Duby
 Hound's-tongue - *Cynoglossum officinale* L.
 Leafy spurge - *Euphorbia esula* L.
 Orange hawkweed - *Hieracium aurantiacum* (L.)
 Ox-eye daisy - *Chrysanthemum leucanthemum* L.
 Perennial sow thistle - *Sonchus arvensis* L.
 Scentless chamomile - *Matricaria perforata* Merat.
 Spotted knapweed - *Centaurea maculosa* Lam.
 Tall buttercup - *Ranunculus acris* L.
 Tall larkspur - *Delphinium glaucum* S. Wats.
 White cockle - *Silene alba* (Mill.) E. H. L. Krause
 Wild caraway - *Carum carvi* (L.)





